

## دليل تصنيف وترميز النفايات وفقاً لنظام التصنيف المنسق عالمياً (GHS)



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|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| ABANDA              | Database on waste analyses ('Abfallanalysendatenbank')                                                                                      | قاعدة البيانات المتعلقة بتحليل النفايات                                                                       |
| ATP                 | Adaptation to Technical Progress                                                                                                            | التعديل تبعاً للتقدم التقني                                                                                   |
| BDE                 | Brominated diphenyl ethers                                                                                                                  | مركبات الإثير الثنائية الفينيل المبرومة                                                                       |
| BREF                | Best Available Techniques Reference Document                                                                                                | أفضل وثيقة مرجعية للتقنيات المتاحة                                                                            |
| BTEX                | Benzene, Toluene, Ethylbenzene and Xylene                                                                                                   | بنزين، تولوين، إيثيل بنزين وزيلين                                                                             |
| CaO                 | Calcium oxide                                                                                                                               | أكسيد الكالسيوم                                                                                               |
| Ca(OH) <sub>2</sub> | Calcium hydroxide                                                                                                                           | هيدروكسيد الكالسيوم                                                                                           |
| CAS                 | Chemical Abstracts                                                                                                                          | المستخلصات الكيميائية                                                                                         |
| CEN                 | European Committee for Standardisation                                                                                                      | اللجنة الأوروبية للمعايير                                                                                     |
| CETDG/GHS           | UN Committee of Experts on the Transport of Dangerous Goods and the Globally Harmonized System of Classification and Labelling of Chemicals | لجنة خبراء الأمم المتحدة المعنية بنقل البضائع الخطرة والنظام العالمي المتوافق لتصنيف وترميز المواد الكيميائية |
| CJEU                | Court of Justice of the European Union                                                                                                      | محكمة العدل التابعة للاتحاد الأوروبي                                                                          |
| C&L                 | Classification & Labelling                                                                                                                  | تصنيف وترميز                                                                                                  |
| CLP                 | European Classification, Labelling and Packaging                                                                                            | القانون الأوروبي للتصنيف والترميز والتعبئة والتغليف                                                           |
| CLRTAP              | Convention on Long-Range Trans-boundary Air Pollution                                                                                       | اتفاقية التلوث الجوي بعيد المدى عبر الحدود                                                                    |
| DAKOFA              | Danish Committee for waste                                                                                                                  | اللجنة الدنماركية للنفايات                                                                                    |
| ECHA                | European Chemicals Agency                                                                                                                   | وكالة المواد الكيميائية الأوروبية                                                                             |
| ECOSOC              | The Economic and Social Council                                                                                                             | المجلس الإقتصادي والإجتماعي                                                                                   |
| EEA                 | European Environmental Agency                                                                                                               | وكالة البيئة الأوروبية                                                                                        |
| ELV                 | End of life vehicles                                                                                                                        | المركبات منتهية الصلاحية                                                                                      |
| ETDS                | Environmental Terminology and Discovery Service                                                                                             | المصطلحات البيئية وخدمة الاكتشاف                                                                              |
| EU                  | European Union                                                                                                                              | الإتحاد الأوروبي                                                                                              |
| GHS                 | Globally Harmonised System                                                                                                                  | النظام العالمي المتوافق لتصنيف وترميز المواد الكيميائية                                                       |
| HP                  | Hazardous properties                                                                                                                        | الخصائص الخطرة                                                                                                |
| EA                  | Environment Authority                                                                                                                       | هيئة البيئة                                                                                                   |
| MW                  | Municipal Waste                                                                                                                             | النفايات البلدية                                                                                              |
| HCW                 | Healthcare Waste                                                                                                                            | نفايات الرعاية الصحية                                                                                         |
| HW                  | Hazardous Waste                                                                                                                             | النفايات الخطرة                                                                                               |
| ICP-MS              | Inductively Coupled Plasma Mass Spectrometry                                                                                                | مقياس مطيافية الكتلة بطريقة البلازما المجمعة بالحث                                                            |

| الاختصار    | المصطلح                                                                                                                 | المعنى باللغة العربية                                                        |
|-------------|-------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| LANUV       | Environment Agency of North Rhine-Westphalia ('Landesamt für Natur, Umwelt und Verbraucherschutz' Nordrhein-Westfalen') | وكالة البيئة في شمال الراين وستفاليا                                         |
| MS          | Member States (in the EU)                                                                                               | الدول الأعضاء في الاتحاد الأوروبي                                            |
| ODS         | Ozone depleting substances                                                                                              | المواد المستنفدة لطبقة الأوزون                                               |
| OSHA        | Occupational Safety & Health Administration                                                                             | إدارة الصحة والسلامة المهنية                                                 |
| PAH         | Polycyclic Aromatic Hydrocarbons                                                                                        | الهيدروكربونات العطرية متعددة الحلقات                                        |
| PCB         | Polychlorinated Biphenyls                                                                                               | ثنائي الفينيل متعدد الكلور                                                   |
| PCDD/PCDF's | Polychlorinated Dibenzo-Dioxins/-Dibenzo-Furans                                                                         | مركبات ثنائي بنزو الديوكسين متعددة الكلور وثنائي بنزو الفيوران متعددة الكلور |
| POP         | Persistent organic pollutants                                                                                           | الملوثات العضوية الثابتة                                                     |
| REACH       | Registration, Evaluation, Authorisation and Restriction of Chemicals                                                    | تسجيل، وتقييم، وترخيص، وتقييد المواد الكيميائية                              |
| STOT        | Specific Target Organ Toxicity                                                                                          | التسمم المستهدف لعضو محدد في الجسم                                           |
| SDS         | Safety data sheets                                                                                                      | أوراق بيانات السلامة (للمواد)                                                |
| TOC         | Total Organic Carbon                                                                                                    | الكربون العضوي الكلي                                                         |
| UN          | United Nations                                                                                                          | الأمم المتحدة                                                                |
| UNECE       | United Nations Economic Commission for Europe                                                                           | لجنة الأمم المتحدة الاقتصادية لأوروبا                                        |
| UNCED       | UN Conference on Environment and Development                                                                            | مؤتمر الأمم المتحدة للبيئة والتنمية                                          |
| UNEP        | United Nations Environment Programme                                                                                    | برنامج الأمم المتحدة للبيئة                                                  |
| US          | United States (of America)                                                                                              | الولايات المتحدة الأمريكية                                                   |
| WEEE        | Waste electrical and electronic equipment                                                                               | نفايات المعدات الكهربائية والإلكترونية                                       |
| WFD         | Waste Framework Directive (2008/98/EC)                                                                                  | الإطار التوجيهي للنفايات                                                     |
| WHO         | World Health Organization                                                                                               | منظمة الصحة العالمية                                                         |

## 1. الموجز التنفيذي

يستند هذا الدليل لتصنيف النفايات على النظام العالمي المتوافق (GHS) والقانون الأوروبي لتصنيف، وترميز، وتعبئة وتغليف المواد الكيميائية (CLP)<sup>1</sup> والأدلة التوجيهية الأخرى ذات الصلة باستثناء قواعد كتالوج النفايات الأوروبي (EWC)؛ وذلك لأن المنهجية المتبعة في كتالوج النفايات الأوروبي (EWC) لا تزال غير واضحة، حيث بالإمكان إيجاد نفس المركب بتصنيفات مختلفة؛ بسبب وروده من مصادر مختلفة. إن استخدام نظام (GHS) يوفر تصنيفاً أكثر دقة ووضوحاً في الوقت الحالي. كما أن الاتحاد الأوروبي قد تبنى مؤخراً نظام (GHS) في قانونهم المتبع لتصنيف النفايات (CLP)، مما سيعزز من دعم المعلومات الضرورية لتنفيذ عملية التصنيف من خلال منظماتهم المتمثلة في وكالة المواد الكيميائية الأوروبية (ECHA) ومنظمة تسجيل، وتقييم، وترخيص، وتقييد المواد الكيميائية (REACH)، كما أن تلك المعلومات ستكون متاحة للجميع.

إن عملية تصنيف النفايات هي مسؤولية تقع على عاتق الجهات المولدة لتلك النفايات. وكخطوة لمساعدة الجهات المولدة للنفايات في هذه العملية قامت شركة "بيئة" بتطوير دليل مفصل لتصنيف النفايات خطوةً بخطوة. إنه من الضروري على كل من الجهات المولدة للنفايات والمرافق المعالجة للنفايات اتباع الإجراءات الموضحة في هذا الدليل بعناية؛ وذلك لضمان امتثالها للقوانين السارية في عملية تصنيف النفايات والتي تهدف لحماية البيئة وصحة الإنسان.

تم إعداد هذا الدليل بناءً على التعاون المشترك بين هيئة البيئة والشركة العمانية القابضة لخدمات البيئة (بيئة)، لذلك من الضروري اعتماد هذا الدليل من هيئة البيئة، حيث أنه سيسهم بفعالية في حماية البيئة وذلك من خلال تطبيق طرق التعامل السليم مع المخلفات الخطرة وغير الخطرة في سلطنة عمان.

## 1. المقدمة

يتم في الوقت الحالي تداول المواد الكيميائية والنفايات الخطرة عبر الحدود في جميع أنحاء العالم، مما يتطلب وضع نظام تصنيف متوافق للنفايات بين جميع الدول؛ تجنباً للإغراق البيئي\* ولحماية صحة الإنسان والبيئة. إن النظام العالمي المتوافق لتصنيف وترميز المواد الكيميائية الجديد (GHS) يوفر قاعدة متناغمة للمعلومات البيئية والصحة والسلامة الموحدة عالمياً والمتعلقة بالمواد الكيميائية والمخاليط. لقد تم تطوير هذا النظام على مستوى الأمم المتحدة، وفي مؤتمر القمة العالمية للتنمية المستدامة المعقود في جوهانسبرغ في عام 2002م، صادقت كل من المفوضية الأوروبية والدول الأعضاء في الاتحاد الأوروبي وأصحاب المصلحة في قطاع الصناعة والمنظمات غير الحكومية على توصية الأمم المتحدة بتطبيق النظام العالمي المتوافق لتصنيف النفايات (GHS) في القانون المحلي.<sup>2</sup>

لقد تم خلال الثلاثين إلى الأربعين سنة الماضية تطوير عدة أنظمة مختلفة لتصنيف وترميز المواد الكيميائية (المواد ومزائج الكيماويات) (المستحضرات)، يطلق عليها في GHS: المخاليط (C&L) من قبل مختلف السلطات القضائية حول العالم كالاتحاد الأوروبي وأستراليا وكندا واليابان والولايات المتحدة الأمريكية والصين وكوريا، مما أدى إلى عدم تطابق المعلومات المتعلقة بالصحة والسلامة لنفس المواد الكيميائية باختلاف الدول المصدرة لهذه المواد رغم تداولها عالمياً.

وفي مؤتمر الأمم المتحدة المعني بالبيئة والتنمية (UNCED) الذي تم عقده في ريو دي جانيرو في عام 1992م، تم الإقرار بالنظام العالمي المتوافق لتصنيف وترميز المواد الكيميائية (GHS) كأحد برامج العمل في الفصل التاسع عشر من جدول الأعمال الواحد والعشرون للمؤتمر.

إن الهدف من هذا العمل هو الجمع بين الأنظمة العالمية الرئيسية لتصنيف والترميز (تحديداً الولايات المتحدة الأمريكية، اليابان، أستراليا، كندا، أنظمة إمدادات الاتحاد الأوروبي، وأنظمة النقل الدولية) في نظام واحد جديد يهدف إلى تعزيز التنمية المستدامة وتسهيل التجارة الدولية. وقد تم تحديد ثلاثة عناصر رئيسية:

- نظام عالمي متوافق لتصنيف للمواد الكيميائية.
- نظام عالمي متوافق لتصنيف للمخاليط ومزائج الكيماويات (المستحضرات) الكيميائية.
- نظام عالمي متوافق لتمييز المواد الخطرة للعاملين والمستهلكين والناقلين، متضمناً ورقة بيان محتويات وورقة بيانات السلامة (SDS).

لقد تم العمل على تطوير النظام منذ منتصف التسعينات بالتعاون مع مختلف المنظمات الدولية. فالدول الأعضاء في الاتحاد الأوروبي واللجنة وعدد كبير من أصحاب المصلحة في قطاع الصناعة كانت لهم مشاركة كبيرة منذ بدء العمل على تطوير هذا النظام.

\* الإغراق البيئي: "هو فرض الدولة معايير بيئية أقل صرامة مما هي عليه في دول أخرى، مما يؤدي إلى لجوء أصحاب المعامل والشركات للاستثمار في هذا البلد".

وفي ديسمبر 2002، تمت الموافقة على النظام العالمي المتوافق المطور لتصنيف النفايات (GHS) من قبل لجنة الخبراء التابعة للأمم المتحدة والمعنية بنقل البضائع الخطرة والنظام العالمي المتوافق لتصنيف وترميز المواد الكيميائية (CETDG/GHS) في هيئة فرعية تابعة للمجلس الاقتصادي والاجتماعي (ECOSOC<sup>1</sup>) تخدمها أمانة لجنة الأمم المتحدة الاقتصادية لأوروبا (UNECE).

وقد تم من بعدها اعتماد نظام التصنيف (GHS) بصورة رسمية من قبل المجلس الاقتصادي والاجتماعي التابع للأمم المتحدة (UNECSOC) في يوليو 2003م بالإضافة إلى اعتماد أول نسخة منقحة للنظام في عام 2005م، ليصبح بعدها متاحاً للتطبيق.

وقد تم خلال مؤتمر القمة العالمية للتنمية المستدامة المعقود في جوهانسبرغ في 4 سبتمبر 2002م تشجيع الدول على تطبيق نظام التصنيف (GHS) في أسرع وقت ممكن، كخطوة للوصول إلى مرحلة التطبيق الكامل للنظام بحلول عام 2008م. ويعترف النهج الإستراتيجي للإدارة الدولية للمواد الكيميائية الذي تم اعتماده من قبل المؤتمر الدولي لإدارة المواد الكيميائية المقام في دبي في السادس من فبراير 2006م بأهمية النظام العالمي المتوافق (GHS)، فقد وضع من ضمن أهدافه: "تعزيز تنفيذ التعاريف والمعايير المشتركة الواردة في النظام العالمي المتوافق لتصنيف النفايات (GHS)".

ولم يتم اعتماد نظام التصنيف العالمي الموحد على مستوى الأمم المتحدة في شكل اتفاقية دولية، ولكنه يوفر في الواقع معياراً دولياً اختيارياً. لقد كان من الضروري اعتماد هذا النهج الاختياري في بداية العملية لاجتذاب جميع الأطراف الرئيسية المعنية. وفي الوقت نفسه، أعربت دول كثيرة عن استعدادها لتنفيذ النظام العالمي المتوافق المتفق عليه في نظمها القانونية.

لقد تم اعتماد التوصيات في مؤتمر القمة العالمية للأمم المتحدة المعني بالتنمية المستدامة من قبل جميع الدول الأعضاء في الاتحاد الأوروبي. وعقب ذلك دعوة الدول الأعضاء في اللجنة لتطبيق النظام العالمي المتوافق (GHS). وفي 29 أكتوبر 2003م أعلنت اللجنة في المذكرة التفسيرية لتعديلات التوجيه (67/ 548/ EEC)، الذي تم اعتماده في الوقت نفسه مع REACH، أن اللجنة تعتزم اقتراح إدراج النظام العالمي المتوافق لتصنيف النفايات (GHS) في قانون المجتمع في أقرب فرصة ممكنة<sup>2</sup>.

وفي عام 2008م اعتمد الاتحاد الأوروبي نظام (GHS) كأساس لتصنيف النفايات لنفايات خطرة أو نفايات غير خطرة تحت ما كان يسمى بالقانون الأوروبي لتصنيف وترميز وتعبئة وتغليف المواد الكيميائية (CLP)<sup>1</sup>. وقد دخل قانون (CLP) حيز التنفيذ في يناير 2009م، حيث تستند طريقة تصنيف المواد الكيميائية وترميزها التي أتاحتها هذا القانون على النظام العالمي المتوافق (GHS) التابع للأمم المتحدة.

<sup>1</sup> المجلس الاقتصادي والاجتماعي (ECOSOC) هو منصة الأمم المتحدة المركزية للاستيطان والمناقشة والتفكير الابتكاري بكل مايتعلق بالتنمية المستدامة.

لقد عمل القانون الأوروبي لتصنيف وترميز وتعبئة وتغليف النفايات (CLP) على استبدال جزأين سابقين من التشريعات التي تعلقت بالمواد الخطرة وتوجيه مزائج الكيماويات (المستحضرات) الخطرة. لقد كانت هذه فترة إنتقالية حتى نهاية عام 2015م.

إن تطبيق نظام عالمي متوافق لتصنيف النفايات يحوز على أهمية قصوى لدى السلطات، حيث أنه يوفر الإرشاد السليم للتخلص من النفايات، كما يحوز على اهتمام الشركات لأسباب عملية ومالية. لذلك فإنه من المهم أن يكون لدى سلطنة عمان نظاماً فعالاً مماثلاً لهذه الغاية.

وينص التوجيه (EC/98/2008) على أن تصنيف النفايات على أنها خطرة ينبغي أن يستند إلى تشريع الاتحاد الأوروبي بشأن المواد الكيميائية، ولا سيما فيما يتعلق بتصنيف مزائج الكيماويات (المستحضرات) على أنها خطرة، بما في ذلك قيم حد التركيز المستخدمة لهذا الغرض.

لقد وجد الاتحاد الأوروبي أنه من الضروري الإبقاء على النظام مع قائمة بأنواع النفايات التي تصنف إلى نفايات خطرة مباشرة وهي تلك التي تم تحديدها في الماضي في مقرر اللجنة (EC/532/2000) والتي تم تعديلها لاحقاً بموجب مقرر اللجنة (EU/955/2014).

ومن أجل تقديم النظام العالمي المتوافق لتصنيف النفايات (GHS) بطريقة سليمة، تحتاج سلطنة عمان إلى اعتماد اتفاقية الأمم المتحدة بشأن نظام التصنيف العالمي (كما فعلت أكثر من 72 دولة أخرى خلال عام 2017م)، وهذا قد يستغرق بعض الوقت. ولأن شركة "بيئة" تواجه يومياً حالات محددة تتطلب اتخاذ قرار تقييم ما إذا كانت النفايات خطرة أم لا، فإنها تقترح على هيئة البيئة الموافقة على استخدام الشركة لهذا الدليل التوجيهي لتصنيف النفايات. وبذلك، ستوافق الوزارة أيضاً على أن تتم معالجة النفايات المصنفة بغير الخطرة بناءً على هذا التصنيف.

## 1.1 القانون الأوروبي للتصنيف والترميز والتعبئة والتغليف (CLP)

إن القانون الأوروبي للتصنيف والترميز والتعبئة والتغليف (CLP) يضمن تحديد المخاطر التي قد يتم التعرض لها من قبل المواد الكيميائية وإبلاغها بوضوح إلى العمال والمستهلكين في الاتحاد الأوروبي من خلال تصنيف المواد الكيميائية وترميزها.

إنه من الواجب على قطاع الصناعة، قبل عرض المواد الكيميائية في السوق، أن يقوم أولاً بتحديد المخاطر المحتملة من استخدام تلك المواد الكيميائية ومزائج الكيماويات (المستحضرات) على صحة الإنسان والبيئة، وتصنيفها بما يتماشى مع المخاطر المحددة مسبقاً. كما يجب أن يتم تصنيف المواد الكيميائية الخطرة وفقاً لنظام موحد؛ بحيث يعرف العمال والمستهلكون آثارها قبل استخدامها أو التعامل معها.

وبفضل هذه العملية، يتم الإبلاغ عن مخاطر المواد الكيميائية من خلال البيانات القياسية والصور التوضيحية على الملصقات وأوراق بيانات السلامة. فعلى سبيل المثال، عندما يحدد المورد مادة على أنها "فئة المواد ذات السمية الحادة 1 (عن طريق الفم)"، فإن الترميز سيشمل على: بيان المخاطر "قاتل إذا تم ابتلاعه"، وكلمة "خطر"، ورسم تخطيطي بجمجمة وعظمتين.

## 2. تصنيف النفايات إلى نفايات خطرة ونفايات غير خطرة

ويستند هذا الدليل الإرشادي لتصنيف النفايات على الدليل الدنماركي التي وضعه هنريك ويجلينغ (النسخة 6.7.15) بصورته التي تم تقديمها لشبكة النفايات والموارد الدنماركية (DAKOFA) في نهاية مارس 2015<sup>3</sup>. وقد تم اعتماد الدليل الإرشادي لتوائم الظروف العمانية. فعلى سبيل المثال، تم استبعاد تطبيق القواعد المتعلقة بالكتالوج الأوروبي للنفايات في التشريعات العمانية؛ نظراً لكون تلك القواعد معقدة بصورة مبالغ بها. ويعد هذا الدليل نسخة من قوانين لجنة الاتحاد الأوروبي رقم: (1357/2014) المؤرخة في 18 ديسمبر 2014م الذي تم فيها طرح تعديلات على الإطار التوجيهي للنفايات (التوجيه 98/2008). المرفق رقم (3) يوضح الخصائص التي تجعل النفايات خطرة، حيث يمثل هذا المرفق "نسخة مبسطة" من قواعد التصنيف الخاصة بالقانون الأوروبي للتصنيف والترميز والتعبئة والتغليف (CLP) (1272/2008). وستتم عملية تصنيف النفايات من خلال خطوتين، هما:

- البحث عن النفايات أولاً في القائمة العمانية للنفايات الخطرة دائماً. والمرفقة في الملحق رقم (1) من هذا الدليل. إذا وجدت النفايات من ضمن القائمة، فإنها تعتبر خطرة تبعاً.
- إذا لم يتم العثور على النفايات في قائمة النفايات الخطرة مطلقاً، فإن الخطوة التالية تتمثل في فحص النفايات.

### 2.1 مقترح تعريف النفايات الخطرة

- النفايات الخطرة: هي النفايات التي تسبب أو تشكل تهديداً لصحة الإنسان أو البيئة نتيجة لخصائصها الفيزيائية أو الكيميائية أو لطبيعتها السمية، و/أو هي قد تكون:
- مواد مشعة يتجاوز نشاطها الإشعاعي حد (100 بيكريل/جم).
  - المواد المتولدة في مرافق الرعاية الصحية ومراكز البحوث والمختبرات المتعلقة بالإجراءات الطبية والنفايات الأخرى، التي قد تكون سبباً لنقل العدوى.
  - المواد التي تدرج تحت أي من الخصائص الخطرة HP1 إلى HP15 فوق حد التركيز المحدد في النظام العالمي المتوافق لتصنيف وترميز المواد الكيميائية (GHS).
  - غير أن حدود التركيز المحددة للمواد أو المخاليط التي تضعها هيئة البيئة ستستخدم دائماً.

## 2.2 تصنيف النفايات بناءً على محتواها من المواد الكيميائية

إن المبدأ في تصنيف النفايات إلى نفايات خطرة ينبغي أن يستند إلى محتوى تلك النفايات من المواد الكيميائية التي تجعلها خطرة، ولا سيما فيما يتعلق بتصنيف مزائج الكيماويات (المستحضرات) على أنها خطرة، بما في ذلك قيم حدود التركيز المستخدمة لهذا الغرض.

ويمكن اختصار خطوات تصنيف النفايات كالآتي:

- (1) تحديد المادة أو المواد في النفايات التي من الممكن أن تجعلها خطرة.
  - (2) تحديد تركيز تلك المواد.
  - (3) البحث في قاعدة بيانات وكالة المواد الكيميائية الأوروبية (ECHA)<sup>4</sup> للمواد الخطرة وتحديد الخصائص الخطرة لتلك المواد (فئة المخاطر، ورمز الفئة، ورمز بيان المخاطر المسجلة لتلك المواد).
  - (4) مقارنة تركيز تلك المواد في النفايات بحد التركيز المحدد لفئة المخاطر ورمز الفئة ورمز بيان المخاطر المسجلة لتلك المواد، حسب الملحق رقم (3) (بناءً على قانون لجنة الاتحاد الأوروبي رقم 1357/2014 بتاريخ 18 ديسمبر 2014)<sup>5</sup>.
- فقط إذا تجاوزت تلك المواد حد التركيز المحدد لها فإنها تصنف إلى نفايات خطرة، أما إذا لم تتجاوزها فإنها تصنف إلى نفايات غير خطرة.

إذا كانت عدة مواد في النفايات تندرج ضمن الخاصية الخطرة ذاتها، فإن مجموع تركيز تلك المواد يجب أن يتوافق مع قيمة حد التركيز المحددة لتلك الخاصية في النفايات (تتطبق القاعدة على خواص خطرة محددة). التفاصيل في الفصل 2.8.

القواعد العامة لتصنيف النفايات هي كالآتي:

- يتم تحديد النفايات برمز واحد فقط، إما نفايات خطرة أو نفايات غير خطرة.
- النفايات المصنفة إلى نفايات خطرة تعني أن تلك النفايات تمثل خاصية خطرة واحدة أو أكثر. جدول الخصائص الخطرة في المرفق رقم (2).
- يتم تحديد الخاصية الخطرة حسب ما هو موضح في المرفق رقم (3).

## 2.3 هل تحتاج هذه النفايات إلى تصنيف؟

قبل تصنيف النفايات، يجب التحقق مما إذا كانت المادة المعنية بحاجة إلى أن تصنف (كما هو معرف في التشريع العماني).

ويجب أن يشمل هذا الدليل على تصنيف جميع أنواع النفايات، والتي يندرج ضمنها نفايات المواد المتفجرة ونفايات المواد المشعة، بالرغم من أن شركة "بيئة" لا تقوم باستقبال هاذين النوعين من النفايات.

كما يجب استبعاد الآتي من هذا الدليل لتصنيف النفايات:

- النفايات السائلة الغازية المنبعثة في الغلاف الجوي. (ولكن الغاز في زجاجات الضغط يتم تصنيفها كنفايات).
- الأراضي (في الموقع) بما في ذلك التربة الملوثة غير المنقولة والمباني المرتبطة بشكل دائم بالأرض.
- التربة غير الملوثة وغيرها من المواد التي تتواجد طبيعياً والتي يتم حفرها في سياق أنشطة البناء؛ حيث من المؤكد أن المواد سوف تستخدم لأغراض البناء في حالتها الطبيعية على الموقع الذي تم حفرها منه.
- قش المخلفات الحيوية وغير ذلك من المواد الزراعية أو المواد الغابية غير الخطرة الطبيعية المستخدمة في الزراعة أو الغابات أو لإنتاج الطاقة من هذه الكتلة الحيوية من خلال عمليات أو أساليب لا تضر بالبيئة أو تعرض صحة الإنسان للخطر.

يستبعد ما يلي من نطاق هذه الوثيقة الإرشادية إلى الحد الذي تغطيه التشريعات العمانية الأخرى:

- مياه الصرف الصحي.
- المنتجات الحيوانية الثانوية، بما في ذلك المنتجات المعالجة باستثناء المنتجات المراد إحراقها أو طمرها أو استخدامها في مصنع للغاز الحيوي أو السماد.
- جثث الحيوانات التي توفيت بخلاف الذبح، بما في ذلك الحيوانات التي قتلت للقضاء على الأمراض البوابية، والتي يتم التخلص منها وفقاً للتشريعات العمانية الأخرى (في حال عدم وجود تشريعات عمانية أخرى ينبغي تطويرها).
- مع عدم الإخلال بالالتزامات بموجب التشريعات المجتمعية الأخرى ذات الصلة، تستثنى من نطاق هذا الدليل الإرشادي الترسبات المنقولة داخل المياه السطحية بغرض إدارة المياه والمجاري المائية أو لمنع الفيضانات أو التخفيف من آثار الفيضانات والجفاف أو استصلاح الأراضي إذا ثبت أن الرواسب غير خطيرة.

ويمكن وضع قواعد محددة لحالات معينة أو تكملة تلك الواردة في الدليل التوجيهي هذا بشأن إدارة أنواع معينة من النفايات من خلال وضع تشريعات فردية.

## 2.4 الخصائص وحد التركيز للنفايات الخطرة

يطرح الملحق رقم (2) أسباب تصنيف المواد على أنها خطيرة، وتعرف هذه الأسباب بالخصائص الخطرة وعددها خمسة عشر، وعليه يتم تحديد رمز المادة الخطرة بأحد الرموز من HP1 إلى HP15 بحسب الخاصية التي تجعل تلك المادة خطيرة، حيث أن HP يرمز إلى Hazardous Property. ويتم تحديد حد تركيز للمواد التي تدرج تحت خصائص خطيرة معينة، بحيث لو تجاوزتها يتم تصنيف تلك النفايات على أنها خطيرة، ولكن لا يتم تطبيق حد التركيز على جميع الخصائص الخطرة. إذ أنه ليس من المنطقي مثلاً وضع حد تركيز للخصائص الفيزيائية / الكيميائية (على سبيل المثال: الخاصية التي تجعل مادة النفايات قابلة للاشتعال أو متفجرة)، في حين أن هناك حد تركيز للمواد الضارة.

(أدنى درجة حرارة يمكن أن <sup>49</sup>وفي حال كانت نقطة الوميض لتلك النفايات تساوي أو تقل عن 60 درجة مئوية يشكل عندها السائل مزيج مع الهواء قابل للاشتعال)، أو إذا كان مجموع المركبات ذات الخصائص الخطرة ( في النفايات أعلى من الحد وفقا للقواعد أدناه، فإنها تصنف على أنها نفايات خطرة. w/w%)

الجدول رقم (1) أدناه تم إدراج جميع الخصائص الخطرة للمواد وتحديد الخصائص الخطرة التي تتماشى والتي لا تتماشى مع حدود التركيز. أما بالنسبة للخصائص الأخرى، فلا يمكن تحديد حد لتركيزها إلا من الناحية التجريبية (على سبيل المثال، الخاصية التي تجعل المادة متفجرة).

الجدول رقم (1): نظرة عامة على الخصائص الخطرة الخمسة عشر التي قد تجعل النفايات خطرة، مع بيان ما إذا كان هناك حد تركيز ثابت.

| الخاصية             | الخاصية الخطرة                                                                                                                                                                                                                              | حد تركيز ثابت                                                                                   |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| فيزيائية / كيميائية | HP1 Explosive (متفجرة)                                                                                                                                                                                                                      | لا معنى لتحديد حد تركيز ثابت                                                                    |
|                     | HP2 Oxidizing (مؤكسدة)                                                                                                                                                                                                                      |                                                                                                 |
|                     | HP3 Flammable (قابلية للاشتعال)                                                                                                                                                                                                             |                                                                                                 |
| مضرة بالصحة         | HP4 Irritant – skin irritation and eye damage (مهيج - تهيج الجلد وتلف العين)                                                                                                                                                                | يتم تحديده بناءً على مزيج من الخصائص الخطرة وفئات المخاطر ورموز بيان المخاطر + حدود تركيز محددة |
|                     | HP5 STOT/ Aspiration Toxicity (سمية مستهدفة لعضو محدد في الجسم / سمية الجهاز التنفسي: عبر دخول مواد سائلة أو صلبة بصورة مباشرة من خلال تحوير الفم أو الأنف، أو بصورة غير مباشرة من خلال القيء، إلى القصبة الهوائية والجهاز التنفسي السفلي). |                                                                                                 |
|                     | HP6 Acute Toxicity (سمية حادة)                                                                                                                                                                                                              |                                                                                                 |
|                     | HP7 Carcinogenic (مسرطنة)                                                                                                                                                                                                                   |                                                                                                 |
|                     | HP8 Corrosive (تسبب تآكل)                                                                                                                                                                                                                   |                                                                                                 |
|                     | HP9 Infectious (معدية)                                                                                                                                                                                                                      |                                                                                                 |
|                     | HP10 Toxic for reproduction (سمية تؤثر على الإنجاب)                                                                                                                                                                                         |                                                                                                 |
|                     | HP11 Mutagenic (تسبب تشوهات وطفرة جينية)                                                                                                                                                                                                    |                                                                                                 |
| مضرة بالبيئة        | HP12 Release of an acute toxic gas (يسبب إطلاق غاز سمي حاد)                                                                                                                                                                                 | لا معنى لتحديد حد تركيز ثابت                                                                    |
|                     | HP13 Sensitizing (يسبب حساسية)                                                                                                                                                                                                              | مثل HP4-8                                                                                       |
|                     | HP14 Eco-toxic (التسمم البيئي)                                                                                                                                                                                                              | غير محدد (بإمكان استخدام قواعد الاتحاد الأوروبي)                                                |
|                     | HP15 Waste capable of exhibiting a hazardous property listed above not directly displayed by the original waste (لها القدرة على عرض الخصائص الخطرة المذكورة أعلاه لكنها لا تظهر مباشرة في النفايات الأصلية)                                 | لا معنى لتحديد حد تركيز ثابت                                                                    |

لقد تم إدراج قيم حد التركيز للمواد في المرفق رقم (3) لهذا الدليل التوجيهي إلى جانب قواعد جمع قيم حد التركيز للمواد التي تندرج تحت خصائص خطرة محددة (كما هو موضح أدناه). في المرفق رقم (3) تتضمن القائمة (أ) قيم حد التركيز مدرجة بحسب الخصائص الخطرة، بينما تتضمن القائمة (ب) في المرفق رقم (3) قيم.

عندما يتم التعرف على المادة التي من الممكن أن تجعل من النفايات خطرة، تتمثل الخطوة التالية في التعرف على تركيز تلك المادة في تلك الحالة و تحديد تفاصيل فئة المخاطر ورمز الفئة ورمز بيان المخاطر وقيمة حد التركيز المسجلة لتلك المادة.

## 2.5 تحديد تركيز المواد الخطرة

يتم تحديد تراكيز المواد عادة من خلال التحليل (مالم يكن التركيز محدداً مسبقاً أو أن يكون من الممكن تحديده حسابياً من خلال معرفة المكونات الدقيقة من خلال ورقة المنتج على سبيل المثال أو ما يعادلها).

## 2.6 إيجاد فئة المخاطر ورمز الفئة ورمز بيان المخاطر المسجلة للمواد

فئة المخاطر ورمز الفئة ورمز بيان المخاطر المسجلة للمواد من الممكن إيجادها عبر الموقع الإلكتروني المحدث لقاعدة بيانات وكالة المواد الكيميائية الأوروبية (ECHA): <https://echa.europa.eu/information-on-chemicals/cl-inventory-database>.

يتم البحث عن المواد في قاعدة بيانات (ECHA) عن طريق إدخال اسم المادة (باللغة الإنجليزية) و / أو عبر واحد أو أكثر من أرقام التعريف التي يتم تخصيصها للمواد الكيميائية (مثل CAS أو EC أو Index-No. - يمكن لقاعدة البيانات التمييز بينها). وعند الشروع بالبحث في قاعدة البيانات في قسم "معلومات عن المواد الكيميائية" (Information on Chemicals)، يجب أولاً القيام بتحديد خانة الموافقة على الشروط والأحكام في الموقع، كما يمكن الانتقال إلى البحث المتقدم لنتائج أكثر دقة كما هو موضح أدناه في الصورة رقم (1): صورة من نموذج البحث في قاعدة بيانات ECHA

الصورة رقم (1): صورة من نموذج البحث في قاعدة بيانات ECHA

**Names and numerical identifiers**

Substance name:  Contains

Numerical identifier:

☐ Search only substances with harmonised classification and labelling

**Classification details**

Hazards:

Search operator:

[View all substances](#)

تتضمن نتيجة البحث عادةً على إدراج خيار واحد أو أكثر، كما هو موضح في الصورة رقم (2): نتيجة البحث عن Index No. 082-001-00-6:

الصورة رقم (2): نتيجة البحث عن Index No. 082-001-00-6: "مركبات الرصاص باستثناء تلك المحددة في مكان آخر من هذا الملحق".

#### > CL Inventory

Searched for: '082-001-00-6', Search only substances with harmonised classification and labelling

| Navn                                                                         | EC / List no. | CAS no. | Index no.    |                                  |
|------------------------------------------------------------------------------|---------------|---------|--------------|----------------------------------|
| lead compounds with the exception of those specified elsewhere in this Annex |               |         | 082-001-00-6 | <input type="button" value="v"/> |

سيتم نفاك إلى صفحة تحتوي على جميع البيانات المتعلقة بمادة البحث كفئة المخاطر ورمز الفئة ورمز بيان المخاطر وقيم حد التركيز وذلك بالضغط على أيقونة "العين" في حال ظهورها أقصى يمين جدول نتائج البحث أو بالضغط على نتيجة البحث ذاتها ومن ثم الضغط على خيار C&L Inventory للحصول على تلك البيانات. الصورة رقم (3): صورة لنتيجة البحث عن "مركبات الرصاص" من قاعدة بيانات ECHA أدناه توضح نتيجة البحث عن "مركبات الرصاص" Index-No. 082-001-00-6.

ومن ثم فإن التمرين هو ببساطة مقارنة فئات المخاطر تلك، ورموز الفئة، ورموز بيان المخاطر مع قيم حد التركيز الواردة في المرفق رقم (3) والعتور على القيمة الأدنى لحد التركيز. بعد ذلك تتم المقارنة بين المحتوى الفعلي في النفايات مع تحديد قيمة حد التركيز، ومعرفة ما إذا كانت المادة موجودة في تركيز أعلى أو أقل من هذا الحد في

النفائات، وبناءاً عليه تصنف النفائات إما خطرة أو غير خطرة. إذا كانت هناك مشاكل في العثور على رموز بيان المخاطر يرجى الإطلاع على المرفق رقم (4).

الصورة رقم (3): صورة لنتيجة البحث عن "مركبات الرصاص" من قاعدة بيانات ECHA

http://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/cl-inventory/view C&L Inventory - ECHA Classifications - CL Inventory x

Harmonised classification - Annex VI of Regulation (EC) No 1272/2008 (CLP Regulation)

General Information

| Index Number | EC Number | CAS Number | International Chemical Identification                                        |
|--------------|-----------|------------|------------------------------------------------------------------------------|
| 082-001-00-6 |           |            | lead compounds with the exception of those specified elsewhere in this Annex |

ATP Inserted / Updated: CLP00  
CLP Classification (Table 3.1)

| Classification                    |                          | Labelling                |                                        |                                 | Specific Concentration limits, M-Factors                   | Notes            |
|-----------------------------------|--------------------------|--------------------------|----------------------------------------|---------------------------------|------------------------------------------------------------|------------------|
| Hazard Class and Category Code(s) | Hazard Statement Code(s) | Hazard Statement Code(s) | Supplementary Hazard Statement Code(s) | Pictograms, Signal Word Code(s) |                                                            |                  |
| Acute Tox. 4 *                    | H302                     | H302                     |                                        | GHS07<br>GHS09<br>GHS08<br>Dgr  | *<br>Repr. 2; H361f: C ≥ 2.5%<br>STOT RE 2; H373: C ≥ 0.5% | Note A<br>Note 1 |
| Acute Tox. 4 *                    | H332                     | H332                     |                                        |                                 |                                                            |                  |
| Repr. 1A                          | H360Df                   | H360Df                   |                                        |                                 |                                                            |                  |
| STOT RE 2 *                       | H373 **                  | H373 **                  |                                        |                                 |                                                            |                  |
| Aquatic Acute 1                   | H400                     |                          |                                        |                                 |                                                            |                  |
| Aquatic Chronic 1                 | H410                     | H410                     |                                        |                                 |                                                            |                  |

| Signal Words | Pictograms                                                                          |                                                                                     |                                                                                       |
|--------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Danger       |  |  |  |
|              | Exclamation mark                                                                    | Environment                                                                         | Health hazard                                                                         |

بالنظر إلى الصورة رقم (3): صورة لنتيجة البحث عن "مركبات الرصاص" من قاعدة بيانات ECHA، نجد أن مركبات الرصاص المذكورة أعلاه تم تصنيفها بفئتي مخاطر ورمزي فئة كما يلي:

1. فئة المخاطر ورمز الفئة 1 Aquatic Acute 1 برمز بيان المخاطر H400 الذي يعني (ذات سمية

شديدة على الحياة المائية)،

2. وفئة المخاطر ورمز الفئة 1 Aquatic Chronic 1 برمز بيان المخاطر H410 الذي يعني (ذات

سمية شديدة وتأثير طويل الأمد على الحياة المائية)،

وبالتالي تكون قيمة حد تركيز مركبات الرصاص في النفائات تساوي 2,500 ملغم/ كج (0.25%)، وعليه فإن وجدت تلك المركبات بنسبة تساوي أو أعلى من 0.25% سوف يتم تصنيف النفائات على أنها نفائات خطرة. مع ذلك يجب الانتباه إلى أن معدن الرصاص النقي ذاته ليس خطراً ولا يجعل من النفائات خطرة.

## 2.6.1 ملاحظات

كما هو ملاحظ في الصورة رقم (3): صورة لنتيجة البحث عن "مركبات الرصاص" من قاعدة بيانات ECHA أعلاه، توجد خانة على يمين الجدول مخصصة للملاحظات (Notes). تقوم ECHA بتوظيف الملاحظات التالية في تصنيفها للمواد:

| رمز<br>الملاحظة | المعنى                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1               | التركيز هو النسبة المئوية لوزن العنصر المعدني المحسوب بالرجوع إلى الوزن الكلي للخليط.                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 2               | تركيز الإيزوسيانات (isocyanate) هو النسبة المئوية لوزن المونومر الحر المحسوب بالرجوع إلى الوزن الكلي للخليط.                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 3               | التركيز المذكور هو النسبة المئوية لوزن أيونات الكرومات (chromate ions) المذابة في الماء محسوبة بالرجوع إلى الوزن الكلي للخليط.                                                                                                                                                                                                                                                                                                                                                                                                     |
| 4               | غير متوفر                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 5               | يتم التعبير عن حد التركيز للمخاليط الغازية عن طريق الحجم/ الحجم % (v/v%).                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 6               | غير متوفر                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 7               | تصنف السبائك المعدنية التي تحتوي على النيكل على أنها مسببة لحساسية الجلد عندما يكون معدل إطلاق النيكل من تلك السبائك أكبر من 0.5 ميكروجرام/سم <sup>2</sup> /أسبوع، وفقاً لطريقة الاختبار المرجعي القياسية الأوروبية EN 1811. (النيكل في السبائك في الغالب ليس خطراً)                                                                                                                                                                                                                                                               |
| A               | غير متوفر                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| B               | يتم وضع بعض المواد (الأحماض والقواعد، وما إلى ذلك) في السوق في محاليل مائية بتركيزات مختلفة، وبالتالي فإن كل محلول منها يتطلب تصنيفاً وترميماً يختلف عن الآخر؛ حيث أن المخاطر تختلف بحسب التركيزات المختلفة. في هذه الحالة يجب على المورد ذكر نسبة تركيز المحلول على الملصق. ويفترض أن يتم حساب نسبة التركيز على أساس الوزن/الوزن (w/w)، ما لم يذكر خلاف ذلك.                                                                                                                                                                      |
| C               | يمكن تسويق بعض المواد العضوية إما في شكل إيزوميري محدد أو كمزيج من عدة إيزومرات (isomers). في هذه الحالة يجب على المورد أن يذكر على الملصق ما إذا كانت المادة إيزومر محدد أو خليط من الإيزومرات.                                                                                                                                                                                                                                                                                                                                   |
| D               | توضع عادةً بعض المواد المعرضة للبللرة التلقائية أو التحلل في السوق في هيئة تحافظ على استقرارها. غير أنه يحدث أحياناً أن يتم وضع هذه المواد في السوق في هيئة غير مستقرة. في هذه الحالة، يجب على المورد أن يذكر على الملصق اسم المادة وعبارة "غير مستقر".                                                                                                                                                                                                                                                                            |
| E               | المواد التي لها آثار محددة على صحة الإنسان (انظر الفصل رقم (4) من المرفق السادس للتوجيه (67/548/EEC)) والتي تصنف على أنها مسرطنة، و/أو تسبب طفرات جينية، و/أو سمية تؤثر على الإنجاب تحت رموز فئتي الخطر 1 أو 2، فإنها ترجع إلى رمز الملاحظة E. كذلك إذا صُنفت على أنها سامة جداً (+ T)، أو سامة (T) أو ضارة (Xn) فإنها ترجع إلى رمز الملاحظة E. بالنسبة لهذه المواد، تسبق عبارات المخاطر R20 و R21 و R22 و R23 و R24 و R25 و R26 و R27 و R28 و R39 و R68 (الضارة) و R48 و R65 وتسبق جميع مجموعات عبارات المخاطر هذه بكلمة "أيضاً". |
| F               | قد تحتوي هذه المادة على مثبت. إذا قام المثبت بتغيير الخواص الخطرة للمادة، كما هو مبين في التصنيف الوارد في الجزء رقم (3)، ينبغي أن يتم التصنيف والترميز وفقاً لقواعد تصنيف المخاليط الخطرة وترميزها.                                                                                                                                                                                                                                                                                                                               |
| G               | يمكن تسويق هذه المادة في هيئة مادة متفجرة، وفي هذه الحالة يجب تقييمها باستخدام طرق الاختبار المناسبة. ويجب أن يعكس التصنيف والترميز لهذه المادة الخصائص المتفجرة.                                                                                                                                                                                                                                                                                                                                                                  |
| H               | غير متوفر                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| I               | غير متوفر                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| J               | لا تصنف المادة كمادة مسرطنة أو مسببة لطفرات جينية إذا أمكن إثبات أن المادة تحتوي على أقل من 0.1% w/w بنزين.                                                                                                                                                                                                                                                                                                                                                                                                                        |

| رمز<br>الملاحظة | المعنى                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| K               | لا تصنف المادة كمادة مسرطنة أو مسببة لطفرات جينية إذا أمكن إثبات أن المادة تحتوي على أقل من 0.1% w/w 1،3- بوتادين.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| L               | لا تصنف المادة كمادة مسرطنة أو مسببة لطفرات جينية إذا أمكن إثبات أن المادة تحتوي على أقل من 3% من مستخلص DMSO كما تم قياسها بطريقة IP 346، وهي: 'تحديد العطرية متعددة الحلقات في زيوت التشحيم القاعدية غير المستخدمة والأسفلتينات الخالية من الكسور البترولية - طريقة استخراج مؤشر الانكسار لثنائي ميثيل سلفوكسيد'، معهد البترول، لندن.                                                                                                                                                                                                                                                                                                          |
| M               | لا تصنف المادة كمادة مسرطنة إذا أمكن إثبات أن المادة تحتوي على أقل من 0.005% w/w بنزو[a]بيرين.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| N               | لا تصنف المادة كمادة مسرطنة إذا كان تاريخ عملية التكرير معروف بأكمله ويمكن من خلاله تبين أن المادة التي يتم إنتاجها ليست مادة مسرطنة.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| O               | غير متوفر                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| P               | لا تصنف المادة كمادة مسرطنة أو مسببة لطفرات جينية إذا أمكن إثبات أن المادة تحتوي على أقل من 0.1% w/w بنزين.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Q*              | لا تصنف المادة كمادة مسرطنة إذا أمكن إثبات أنها تستوفي أحد الشروط الآتية: <ul style="list-style-type: none"> <li>• أن يظهر الاختبار قصير المدى للمقاومة الحيوية عن طريق الاستنشاق أن الألياف ذات طول أعلى من 20 مايكرومتر لها عمر مرجح أقل من 10 أيام. أو</li> <li>• أن يظهر الاختبار قصير المدى للمقاومة الحيوية عن طريق التقطير داخل القصبة الهوائية أن الألياف ذات طول أعلى من 20 مايكرومتر لها عمر مرجح أقل من 40 يوماً. أو</li> <li>• أن يظهر اختبار الحقن داخل الصفاق (البريتوان) عدم وجود دليل على أي نمو سرطاني. أو</li> <li>• أن يظهر اختبار استنشاق طويل الأمد عدم وجود مسببات الأمراض أو أي تغيرات ورمية ذات صلة بالسرطان.</li> </ul> |
| R*              | لا تصنف المادة كمادة مسرطنة إذا كانت الألياف ذات قطر متوسط طوله أقل أو أعلى بدرجتين خطأ (-2 أو +2) من 6 ميكرومتر.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| S               | غير متوفر                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| T               | غير متوفر                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| U               | يجب أن يتم ترميز الغازات عند عرضها في السوق إلى "غازات تحت الضغط" وأن يتم تصنيفها حسب الحالة الفيزيائية التي وجدت بها عند تعبئتها وتغليفها، سواء كانت في هيئة غاز مضغوط أو غاز مسال أو غاز مسال مبرد أو غاز مذاب.                                                                                                                                                                                                                                                                                                                                                                                                                                |

\* تتعلق بالصوف الصخري (المعدني)، حيث أنه تم تصنيف الصوف الصخري قبل عام 1997م على أنه نفايات خطرة، أما بعد عام 1997م فلم يعد يعتبر من النفايات الخطرة.

الجدول رقم (3): فئة الخطر ورمز الفئة مرتبة بحسب رمز بيان المخاطر - HXXX، مثال: مركبات الرصاص المذكورة أعلاه موضحة باللون الأحمر.

| Hazard Classes and Category codes | Hazard Statement code | CL (%) | Hazard Classes and Category codes | Hazard Statement code | CL (%) |
|-----------------------------------|-----------------------|--------|-----------------------------------|-----------------------|--------|
| Acute Tox. 1 (oral)               | H300                  | 0.1    | Acute Tox 4 (inhal.)              | H332                  | 22.5   |
| Acute Tox. 2 (oral)               | H300                  | 0.25   | Resp. Sens. 1                     | H334                  | 10     |
| Acute Tox. 3 (oral)               | H301                  | 5      | STOT SE3                          | H335                  | 20     |
| Acute Tox 4 (oral)                | H302                  | 25     | Muta 1A + 1B                      | H340                  | 0.1    |
| Asp. Tox. 1                       | H304                  | 10     | Muta. 2                           | H341                  | 1      |
| Acute Tox. 1 (dermal)             | H310                  | 0.25   | Carc. 1A + 1B                     | H350                  | 0.1    |
| Acute Tox. 2 (dermal)             | H310                  | 2.5    | Carc. 2                           | H351                  | 1      |
| Acute Tox. 3 (dermal)             | H311                  | 15     | Repr. 1A + 1b                     | H360                  | 0.3    |
| Acute Tox. 4 (dermal)             | H312                  | 55     | Repr. 2                           | H361                  | 3      |
| Skin corr. 1A                     | H314                  | 1      | STOT SE 1                         | H370                  | 1      |
| Skin corr. 1B +1C                 | H314                  | 5      | STOT SE2                          | H371                  | 10     |
| Skin irrit. 2                     | H315                  | 20     | STOT RE1                          | H372                  | 1      |
| Skin Sens. 1                      | H317                  | 10     | STOT RE2                          | H373                  | 10     |
| Eye dam. 1                        | H318                  | 10     | Aquatic Acute, 1                  | H400                  | 25     |
| Eye irrit. 2                      | H319                  | 20     | Aquatic Chronic, 1                | H410                  | 0.25   |
| Acute Tox. 1 (inhal.)             | H330                  | 0.1    | Aquatic Chronic, 2                | H411                  | 2.5    |
| Acute Tox. 2 (inhal.)             | H330                  | 0.5    | Aquatic Chronic, 3,               | H412                  | 25     |
| Acute Tox. 3 (inhal.)             | H331                  | 3.5    | Aquatic Chronic 4                 | H413                  | 25     |
|                                   |                       |        | Ozone 1                           | H420                  | 0.1    |

## 2.7 قيم حدود التركيز المحددة

تنص المادة العاشرة من القانون الأوروبي للتصنيف والتميز والتعبئة والتغليف الأوروبي (CLP) على الآتي:

- إن حدود التركيز المحددة وحدود التركيز العامة هي حدود مخصصة لمادة كيميائية معينة تشير إلى عتبة حد التفاعل، فعندما يكون تركيز وجود تلك المادة في مادة أخرى أو خليط مساوياً أو أعلى من الحد المذكور، فإن ذلك يؤدي إلى تصنيف المادة أو الخليط على أنه خطر.
- في حال توافرت معلومات علمية كافية وموثوقة تفيد بأن مادة ما تظهر الخطر المحدد لها عند مستوى تركيز أقل من حد التركيز المحدد لها ضمن المواد في أي من فئات الخطر في المرفق رقم (3)، حينها يجوز للمصنع أو المستورد أو المستخدم النهائي أن يضع حداً أكثر دقة للتركيز الذي يجعل تلك المادة خطرة.
- في الظروف الاستثنائية وعند وجود معلومات علمية كافية وموثوقة وقاطعة تفيد بأن مادة ما لا تظهر الخطر المحدد لها عند مستوى تركيز أعلى من حد التركيز المحدد لتلك المادة بحسب تصنيف المخاطر في المرفق رقم (3)، حينها يجوز للمصنع أو المستورد أو المستخدم النهائي أن يضع حداً أكثر دقة للتركيز الذي يجعل تلك المادة خطرة.

إنه من المهم دائماً العودة إلى "قيم حد التركيز المحددة" للتحقق مما إذا كان هناك حد تركيز أقل، حيث أنه لو وجد حد تركيز أقل فإنه يؤخذ على أنه "حد التركيز" الذي سيحدد تصنيف تلك النفايات على أنها خطرة. في مثال مركبات الرصاص أعلاه، يكون لفئة المخاطر Repr. 1A, H360 حد تركيز عام يساوي 0.3%، بينما حدود التركيز المحددة (كما في الصورة رقم (3): صورة لنتيجة البحث عن "مركبات الرصاص" من قاعدة بيانات ECHA على يمين الجدول قبل الملاحظات) كلاهما أعلى من حد التركيز العام (2.5% و 0.5% على التوالي). ولكن هناك أيضاً أمثلة على العكس.

## 2.8 قواعد الجمع

عند وجود عدة مواد في النفايات جميعها مصنفة تحت فئة المخاطر ورمز الفئة ورمز بيان المخاطر ذاته، فإنه يجب أن يتم جمع تركيز تلك المواد في حال كانت تدرج ضمن خصائص خطرة محددة دون غيرها (هذه القاعدة لا تنطبق على جميع الخصائص الخطرة)، وذلك عندما تتجاوز كل مادة من تلك المواد قيمة الحد الأدنى \* (Cut-off value) المحددة لها. ويمكن الاطلاع على قواعد الجمع بصورة تفصيلية في الملحق رقم (3) وكما هو مختصر في

الجدول رقم (4): مختصر لقواعد الجمع.

الجدول رقم (4): مختصر لقواعد الجمع.

| Must be summed                                                                                                                                                                         | Is not allowed to be summed                         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|
| HP4 - Irritant – skin irritation and eye damage<br>- Skin corr.<br>- Eye dam.<br>- Skin irrit.<br>- Eye irrit.                                                                         | HP5 – STOT (but Aspiration Toxicity must be summed) |
| HP5 – only Aspiration Toxicity                                                                                                                                                         | HP7 - Carcinogenic                                  |
| HP6 - Acute Toxicity (1-4)                                                                                                                                                             | HP10 - Toxic for reproduction                       |
| HP8 – Corrosive<br>- Skin corr.                                                                                                                                                        | HP11 - Mutagenic                                    |
| HP14 – Ecotoxic<br>$100 \times \Sigma c (H410) + 10 \times \Sigma c (H411) + \Sigma c (H412) \geq 25 \%$<br>$\Sigma c H410 + \Sigma c H411 + \Sigma c H412 + \Sigma c H413 \geq 25 \%$ | HP13 – Sensitising<br>- Skin sens.<br>- Resp. Sens. |

\* قيمة الحد الأدنى (Cut-off value): الحد الأدنى من تركيز المادة التي تؤخذ في الاعتبار لأغراض التصنيف (لا تؤدي بالضرورة إلى تصنيف).

الجدول رقم (5): المزيد من قواعد الجمع.

| Further rules for summation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>For Acute Toxic only substances with the exact same properties shall be summed</p> <ul style="list-style-type: none"> <li>This means only concentration of substances with exact same combination of hazard classes, category code and hazard statement codes shall be summed</li> </ul> <p>e.g. Acute Tox. 1, H300 and Acute Tox. 1, H300 <b>shall</b> be summed</p> <p>but</p> <p>Acute Tox. 1, H300 and Acute Tox. 1, H330 <b>must not</b> be summed<br/> Acute Tox. 1, H300 and Acute Tox. 2, H300 <b>must not</b> be summed</p> |
| <p>Irritant and Corrosive must be summed across their properties, this covers</p> <ul style="list-style-type: none"> <li>HP4 - Irritant – skin irritation and eye damage <ul style="list-style-type: none"> <li>Skin irrit. 2, H315 and Eye irrit. 2 H315 <b>must</b> be summed</li> </ul> </li> <li>HP8 – Corrosive <ul style="list-style-type: none"> <li>Skin Corr. 1A, H314, Skin Corr. 1B, H314 and Skin Corr. 1 C, H314 <b>must</b> all be summed</li> </ul> </li> </ul>                                                          |

## 2.9 قيمة الحد الأدنى (Cut-off value) لتطبيق قاعدة الجمع

عند تطبيق قاعدة الجمع هناك قاعدة أساسية:

لجميع الخصائص الخطرة الخاضعة لقاعدة الجمع\* تكون هناك قيمة حد أدنى محددة قبل الجمع:

- 0.1% للمواد ذات خاصية السمية الحادة (Acute Tox.) HP6.
- لكن لا تنطبق هذه القاعدة على المواد ذات خاصية السمية الحادة 4 (Acute Tox. 4) (HP312, HP302, HP332).
- 1% للمواد المسببة للتهيج (Irritant) والتآكل (Corrosive) HP4 و HP8.
- بالإضافة إلى جميع المواد ذات خاصية السمية الحادة 4 (Acute Tox. 4) التي تدرج تحت HP6.
- \* لا تشمل هذه القاعدة المواد ذات خاصية سمية للجهاز التنفسي 1 (Aspiration Tox. 1) التي تدرج تحت HP5 حيث لا توجد قيمة حد أدنى محددة.

وهذا يعني بأن قيمة تركيز المواد ذات الخصائص المذكورة أعلاه تجمع فقط حين تكون قيمة تركيزها تساوي أو أعلى من 0.1% أو 1%.

الجدول رقم (6): نظرة عامة على قائمة رموز بيان المخاطر التي تنطبق عليها قاعدة الجمع.

| Substance 1                                       |                       |   | Substance 2                       |                       |         |             |
|---------------------------------------------------|-----------------------|---|-----------------------------------|-----------------------|---------|-------------|
| Hazard Classes and Category codes                 | Hazard Statement code |   | Hazard Classes and Category codes | Hazard Statement code | Summed? | *Min. conc. |
| Acute Tox. 1                                      | H300                  | + | Acute Tox. 1                      | H300                  | Must be | 0.1 %       |
| Skin irrit. 2                                     | H315                  | + | Eye irrit. 2                      | H319                  | Must be | 1%          |
| Skin corr. 1B +1C                                 | H314                  | + | Skin corr. 1A                     | H314                  | Must be | 1%          |
| Eye dam. 1                                        | H318                  | + | Eye Dam. 1                        | H318                  | Must be | 1%          |
| Acute Tox. 1 (Oral)                               | H300                  | + | Acute Tox. 1 (Oral)               | H300                  | Must be | 0.1 %       |
| Acute Tox. 2 (Oral)                               | H300                  | + | Acute Tox. 2 (Oral)               | H300                  | Must be | 0.1 %       |
| Acute Tox. 3(Oral)                                | H301                  | + | Acute Tox. 3(Oral)                | H301                  | Must be | 0.1 %       |
| Acute Tox. 4 (Oral)                               | H302                  | + | Acute Tox. 4 (Oral)               | H302                  | Must be | 1%          |
| Acute Tox. 1 (Dermal)                             | H310                  | + | Acute Tox. 1 (Dermal)             | H310                  | Must be | 0.1 %       |
| Acute Tox. 2 (Dermal)                             | H310                  | + | Acute Tox. 2 (Dermal)             | H310                  | Must be | 0.1 %       |
| Acute Tox. 3 (Dermal)                             | H311                  | + | Acute Tox. 3 (Dermal)             | H311                  | Must be | 0.1 %       |
| Acute Tox. 4 (Dermal)                             | H312                  | + | Acute Tox. 4 (Dermal)             | H312                  | Must be | 1%          |
| Acute Tox. 2 (Inhal.)                             | H330                  | + | Acute Tox. 2 (Inhal.)             | H330                  | Must be | 0.1 %       |
| Acute Tox. 3 (Inhal.)                             | H331                  | + | Acute Tox. 3 (Inhal.)             | H331                  | Must be | 0.1 %       |
| Acute Tox. 4 (Inhal.)                             | H332                  | + | Acute Tox. 4 (Inhal.)             | H332                  | Must be | 1%          |
| Asp. Tox. 1                                       | H304                  | + | Asp. Tox. 1                       | H304                  | Must be | 0%          |
| Aquatic Cronic 1                                  | 100 × H410            | + | Aquatic Cronic 2+ 3               | 10 × 411 + 1 × H412   | Must be | 0.1%+1%+ 1% |
| Aquatic Cronic 1                                  | H410                  | + | Aquatic Cronic 2+ 4               | H411 + H413           | Must be | 0.1%+1%+ 1% |
| All other Hazard Statement Codes cannot be summed |                       |   |                                   |                       |         |             |

\* This means that the concentration of the substances with the mentioned properties shall only be summed when they are equal to or override 0.1 % or 1 %.

## 2.10 تطبيق قاعدة الجمع على قيم تركيز محددة

عند وجود نوعان أو أكثر من المواد التي تندرج تحت فئة المخاطر ورمز الفئة ورمز بيان المخاطر ذاته ولكن لكل منها قيمة حد تركيز مختلفة (حيث أن مادة أو أكثر قد تم منحها قيمة حد تركيز محددة) يتم حينها تطبيق قاعدة الجمع حيث يكون تركيز كل مادة مقسوماً على قيمة حد تركيزها، فإذا كان مجموع هذه القيم هو  $1 \leq$ ، تصنف حينها النفايات إلى نفايات خطرة.

على سبيل المثال:

تركيز المادة أ = 2% وحد التركيز لها هو 2.5%،

تركيز المادة ب = 1% وحد التركيز لها هو 10%،

تركيز المادة ج = 0.1% وحد التركيز لها هو 0.5%.

تكون نتيجة الجمع حينها كالآتي:

$$\text{أ: } 0.8 = 2\% \div 2.5\%$$

$$\text{ب: } 0.1 = 1\% \div 10\%$$

$$\text{ج: } 0.2 = 0.1\% \div 0.5\%$$

حاصل جمع (أ + ب + ج) =  $0.8 + 0.1 + 0.2 = 1.1$  وهي قيمة  $1 \leq$ ، مما يعني بأن هذه النفايات تصنف على أنها نفايات خطرة.

## 2.11 حالات خاصة

يتم تطبيق قواعد خاصة لتصنيف النفايات في الحالات الآتية:

- النفايات المنزلية.
- النفايات المشعة.
- المسممات البيئية.
- الملوثات العضوية الثابتة (POPs).
- الهيدروكربونات.
- النفايات المعدية.
- النفايات المتفجرة.
- النفايات المؤكسدة.
- النفايات القابلة للاشتعال.

### 2.11.1 النفايات المنزلية

إن النفايات المنزلية قد تكون نفايات بلدية أو نفايات خطرة، غير أنه لا يتم تصنيفها في كلا الحالتين (وإن احتوت على نفايات منزلية خطرة. لكن يجوز مستقبلاً أن تتم إزالة النفايات الخطرة من النفايات المنزلية إن وجد ذلك ممكناً).

### 2.11.2 النفايات المشعة

يتم تصنيف النفايات على أنها مشعة إذا تجاوز نشاطها الإشعاعي (100 بيكريل/ جم).

### 2.11.3 المسممات البيئية

قام الاتحاد الأوروبي بتاريخ 5 يوليو 2017م بإضافة تعديل للملحق الثالث في التوجيه (EC/98/2008) ليشمل المسممات البيئية، كما هو موضح أدناه: 52,53.

" مسمم بيئي HP14 ": هي النفايات التي تشكل أو قد تشكل مخاطر فورية أو بعيدة المدى لقسم أو أكثر من أقسام البيئة. باختصار قيم الحد للمواد الخطرة التي تدرج تحت خاصية مسمم بيئي HP14:

- ذات سمية شديدة على الحياة المائية 1 (Aquatic Acute 1): H400 : 25%
- ذات سمية شديدة وتأثير طويل الأمد على الحياة المائية 1 (Aquatic Chronic 1): H410 : 0.25%
- ذات سمية شديدة وتأثير طويل الأمد على الحياة المائية 2 (Aquatic Chronic 2): H411 : 2.5%
- ذات سمية شديدة وتأثير طويل الأمد على الحياة المائية 3 (Aquatic Chronic 3): H412 : 25%
- ذات سمية شديدة وتأثير طويل الأمد على الحياة المائية 4 (Aquatic Chronic 4): H413 : 25%
- أوزون 1 (Ozone 1): H420 : 0.1%

ويتم كذلك تطبيق قاعدة الجمع في بعض الحالات كما سيتم توضيحها لاحقاً.

النفايات التي تنطبق عليها أحد الشروط المذكورة أدناه أو أكثر يتم تصنيفها إلى نفايات خطرة تحت خاصية مسمم بيئي HP14:

- النفايات التي تحتوي على مادة مصنفة على أنها مستنفذة للأوزون Ozone depleting substance تحت رمز بيان المخاطر H420 وبتركيز مساوي أو أعلى من حد التركيز المحدد لها (0.1%).

$$[c(H420) \geq 0,1 \, \%]$$

- النفايات التي تحتوي على مادة أو أكثر مصنفة على أنها ذات سمية شديدة على الحياة المائية (Aquatic Acute) تحت رمز بيان المخاطر H400 ويكون مجموع تركيز تلك المواد مساوي أو أعلى من حد التركيز 25%. على أن تكون قيمة الحد الأدنى لتلك المواد (Cut-off value) تساوي 0.1%.

$$[\Sigma c (H400) \geq 25 \, \%]$$

• النفايات التي تحتوي على مادة أو أكثر مصنفة على أنها ذات سمية شديدة وتأثير طويل الأمد على الحياة المائية (Aquatic Chronic) 1 أو 2 أو 3، تحت رموز بيان المخاطر H410 أو H411 أو H412، وبمجموع تركيز كالاتي:

- مجموع تركيز المواد المصنفة على أنها ذات سمية شديدة وتأثير طويل الأمد على الحياة المائية 1 (Aquatic Chronic) 1 برمز بيان المخاطر H410 مضروباً بالعدد 100، مضافة إلى:
- مجموع تركيز المواد المصنفة على أنها ذات سمية شديدة وتأثير طويل الأمد على الحياة المائية 2 (Aquatic Chronic) 2 برمز بيان المخاطر H411 مضروباً بالعدد 10 مضافة إلى: مجموع تركيز المواد المصنفة على أنها ذات سمية شديدة وتأثير طويل الأمد على الحياة المائية 3 (Aquatic Chronic) 3 برمز بيان المخاطر H412.

ويكون المجموع الكلي لتركيز جميع تلك المواد مساوياً أو أكبر من حد التركيز 25%. على أن تكون قيمة الحد الأدنى (Cut-off value) للمواد برمز بيان المخاطر H410 تساوي 0.1% وللمواد برمز بيان المخاطر H411 أو H412 تساوي 1%.

$$[100 \times \Sigma c (H410) + 10 \times \Sigma c (H411) + 1 \times \Sigma c (H412) \geq 25 \%]$$

• النفايات التي تحتوي على مادة أو أكثر مصنفة على أنها ذات سمية شديدة وتأثير طويل الأمد على الحياة المائية (Aquatic Chronic) 1 أو 2 أو 3 أو 4، تحت رموز بيان المخاطر H410 أو H411 أو H412 أو H413، ويكون مجموع تركيز جميع المواد التي تندرج تحت هذا التصنيف مساوياً أو أكبر من قيمة حد التركيز وهي 25%. على أن تكون قيمة الحد الأدنى (Cut-off value) للمواد برمز بيان المخاطر H410 تساوي 0.1% وللمواد برمز بيان المخاطر H411 أو H412 أو H413 تساوي 1%.

$$[\Sigma c H410 + \Sigma c H411 + \Sigma c H412 + \Sigma c H413 \geq 25 \%]$$

\* حيث أن:  $\Sigma c$  = مجموع،  $c$  = تركيز المواد.

تم ذكر رموز بيان المخاطر للمواد المسببة للتسمم البيئي في

أعلاه.

### الملوثات العضوية الثابتة (POPs)

وبغض النظر عن قواعد التصنيف المذكورة سابقاً ، ووفقاً للائحة المفوضية الأوروبية (التابعة للاتحاد الأوروبي) رقم (1357/2014) والمؤرخة في 18 ديسمبر 2014، فإنه تم تحديد خمس عشرة مادة على أنها ملوثات عضوية ثابتة (POPs) والتي تعتبر -وفقاً لاتفاقية ستوكهولم<sup>6,8</sup>- نفايات خطيرة عندما تتواجد بتركيزات تتجاوز الحدود الواردة في المرفق الرابع من لائحة الاتحاد الأوروبي للملوثات العضوية الثابتة (لائحة البرلمان والمجلس الأوروبي رقم (850/2004) المؤرخة في 29 أبريل 2004 بشأن الملوثات العضوية الثابتة بصيغتها المعدلة). ويمكن الاطلاع على الملوثات العضوية الثابتة وقيم حد التركيز لكل منها في .

الجدول رقم (7): قيم حد التركيز للملوثات العضوية الثابتة POPs والتي تصنف في حال تجاوزت تلك القيمة على أنها نفايات خطرة .  
الجدول رقم (7): قيم حد التركيز للملوثات العضوية الثابتة POPs والتي تصنف في حال تجاوزت تلك القيمة على أنها نفايات خطرة .

| رقم | جميع الملوثات العضوية الثابتة POPs حتى أغسطس 2017<br>النفايات التي تحتوي على ملوثات عضوية ثابتة POPs                                    | نسبة حد التركيز (%) | قيمة حد التركيز |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------|---------------------|-----------------|
| 1   | Polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD'er/PCDDF'er)                                                                  | 0.0000015           | 15µg/kg         |
| 2   | DDT (1,1,1-trichlor- 2,2-bis (4-chlorophenyl)ethane)                                                                                    | 0.005               | 50 mg/kg        |
| 3   | Chlordane                                                                                                                               | 0.005               |                 |
| 4   | Hexachlorocyclohexane (including Lindane)                                                                                               | 0.005               |                 |
| 5   | Dieldrin                                                                                                                                | 0.005               |                 |
| 6   | Endrin                                                                                                                                  | 0.005               |                 |
| 7   | Heptachlor                                                                                                                              | 0.005               |                 |
| 8   | Hexachlorobenzene                                                                                                                       | 0.005               |                 |
| 9   | Chlordecone                                                                                                                             | 0.005               |                 |
| 10  | Aldrin                                                                                                                                  | 0.005               |                 |
| 11  | Pentachlorobenzene                                                                                                                      | 0.005               |                 |
| 12  | Mirex                                                                                                                                   | 0.005               |                 |
| 13  | Toxaphene                                                                                                                               | 0.005               |                 |
| 14  | Hexabromobiphenyl                                                                                                                       | 0.005               |                 |
| 15  | PCB                                                                                                                                     | 0.005               |                 |
| 16  | Endosulfan                                                                                                                              | 0.25                | 2500            |
| 17  | Hexachlorbutadiene (HCBD)                                                                                                               | غير محدد            | غير محدد        |
| 18  | Polychlorinated Naphthalene (PCN)                                                                                                       | غير محدد            | غير محدد        |
| 19  | Pentachlorobenzene (PeCB)                                                                                                               | غير محدد            | غير محدد        |
| 20  | Short-chained chlorinated Paraffins C10-C13 (SCCP)                                                                                      | 0.25                | 2500            |
| 21  | Perfluorooctanesulphonic Acid and Derivatives thereof (PFOS)                                                                            | 0.3                 | 3000            |
| 22  | Brominated Flame Retardants ( SUM of Tetrabromodiphenylether, Pentabromodiphenylether, Hexabromodiphenylether, Heptabromodiphenylether) | 0.25                | 2500            |

وهذا يعني أنه إذا كان تركيز النفايات في المواد المذكورة أعلاه أعلى من حد التركيز (على سبيل المثال: 50 ملغم/ كغم بالنسبة لمركبات ثنائي الفينيل متعددة الكلور PCB أو 15 ميكروغرام / كغم بالنسبة لمركبات ثنائي بنزو الديوكسين متعددة الكلور وثنائي بنزو الفيوران متعددة الكلور PCDD/PCDF's)، فإنه يجب تصنيف النفايات إلى نفايات خطرة.

#### 2.11.4 الهيدروكربونات

قامت شبكة النفايات والموارد الدنماركية (DAKOFA) بتحديد قائمة تشمل ثمانين مادة تقريباً يمكنها أن تجعل من جميع أنواع النفايات خطرة، كما تدرج تلك القائمة تصنيف كل مادة من تلك المواد. وبالتالي فإنه يمكن اعتبار تلك القائمة اختصاراً لتصنيف النفايات الخطرة بصورة عامة.<sup>51</sup> وتناقش تلك القائمة الظروف التي تحول فيها الهيدروكربونات النفايات إلى نفايات خطرة. ومن الممكن للهيدروكربونات (مثل ملوثات النفط والبنزين في التربة) أن تجعل النفايات خطرة، ولكن يصعب استخدام القائمة المتوافقة للمواد الخطرة في قاعدة بيانات وكالة المواد الكيميائية الأوروبية (ECHA) لتحديد ما إذا كانت تلك الهيدروكربونات خطرة أم لا؛ لأنها تشمل فقط هيدروكربونات معينة ذات سلاسل كربونية محددة الأطوال، إلخ. وهكذا، يتم تصنيف وقود الطائرات النفثة ومحركات الديزل (زيت الغاز) ذات سلسلة كربونية يتراوح طولها ما بين 9-20 ذرة كربون (C9-C20) على أنها مواد مسرطنة 2 (Carc.2) H351 ، وبالتالي تصبح النفايات خطرة عندما يكون تركيز

الهيدروكربونات 1% (10,000 ملغ / كغ TS) أو أعلى. العديد من الهيدروكربونات الأخرى كنقطة انطلاق تصنف على أنها مواد مسرطنة 1 ب (H350 (Carc.1 B)، بحد تركيز يساوي 0.1% (1000 ملغ / كغ TS). بعض الزيوت ليست مسرطنة إذا كان محتوى البنزين أقل من 0.1%.<sup>50, 51</sup>

وبالتالي لا يمكن تصنيف الهيدروكربونات على هذا النحو في قاعدة بيانات وكالة المواد الكيميائية الأوروبية (ECHA)، ولكن يمكن تعريف النفايات النفطية بصورة عامة على أنها نفايات خطرة مع قيمة حد تركيز تساوي 0.1%<sup>50, 51</sup>، وذلك استناداً إلى المناقشة المذكورة أعلاه. في سلطنة عمان حددت هيئة البيئة النفايات النفطية على أنها نفايات خطرة ذات قيمة حد تركيز تساوي 1%.

### 2.11.5 النفايات المعدية

النفايات المعدية (HP9 (Infectious Waste وتعرف بأنها النفايات التي تحتوي على الكائنات الحية المجهرية أو سمومها، وهي معروفة كمسببات للأمراض سواءاً للإنسان أو الكائنات الحية الأخرى. وتوفر منظمة الصحة العالمية نظاماً معترفاً به على نطاق واسع يصنف الكائنات الحية الدقيقة وفقاً لأربع مجموعات للمخاطر. ويستخدم هذا النظام أيضاً في سلطنة عمان. تشمل نفايات الرعاية الصحية في السلطنة جميع النفايات المتولدة من مرافق الرعاية الصحية ومراكز البحوث والمختبرات المرتبطة بالإجراءات الطبية والنفايات الأخرى المعرضة لخطر العدوى. ولذلك تصنف نفايات الرعاية الصحية/ النفايات المعدية على أنها نفايات خطرة.

كما أن جثث الحيوانات النافقة قد تكون معدية. ففي بعض الدول الأخرى تهتم شركات خاصة بالحيوانات النافقة، الأمر الذي من الممكن أن يتم تطبيقه في السلطنة مستقبلاً. أما في الوقت الراهن، يتم تصنيف جثث الحيوانات النافقة في السلطنة على أنها نفايات غير خطرة ويتم التخلص منها عن طريق إرسالها إلى المرامد الهندسية الخاصة بالنفايات البلدية أو عن طريق دفنها.

### 2.11.6 النفايات المتفجرة

فيما يتعلق بالخاصية الخطرة HP1، يستثني النظام العالمي المتوافق لتصنيف النفايات (GHS)؛ تصنيف المتفجرات الخارجة من نطاق الخدمة (decommissioned waste explosives). لذلك يجب أولاً التحقق مما إذا كانت النفايات المعنية هي نفايات خطرة. يشرح النظام العالمي المتوافق (GHS) تلك النقطة كالاتي:

"يتم تصنيف النفايات على أنها نفايات خطرة تحت الخاصية الخطرة HP1 إذا تم إثبات احتواء تلك النفايات على مادة أو أكثر مصنفة تحت أحد رموز بيانات المخاطر الآتية (ما لم يكن مولد النفايات قادر على إثبات غير ذلك عن طريق الاختبارات (انظر التذييل رقم (5) الفصل (9.1)):

- H200
- H201
- H202

- H203
- H204
- H205
- H240
- H241
- "EUH001".

عندما تصبح بعض المنتجات نفايات قابلة للانفجار، يجب أن يتم تصنيفها تحت الخاصية الخطرة HP1. (قد H205 تكون بعض المواد متفجرة في ظروف معينة. على سبيل المثال، تلك المصنفة تحت رموز بيان المخاطر: (تصبح قابلة للانفجار عندما تجف). هذه المواد لا تصنف تحت الخاصية الخطرة EUH001 (تنفجر كتلة من النار) و (لها القدرة على عرض H15، ولكن وجودها في النفايات يمكن أن يجعل تلك النفايات تظهر الخاصية الخطرة HP1 الخصائص الخطرة المذكورة

الجدول رقم (1) لكنها لا تظهر مباشرة في النفايات الأصلية؛ انظر الفصل (9.15) للحصول على مزيد من التفاصيل. النفايات التي تحتوي على مواد مصنفة تحت رموز بيان المخاطر H240 و H241 يجب أن يتم تصنيفها تحت الخاصية الخطرة HP3 (نفايات قابلة للاشتعال)، حيث أن تلك النفايات لم يتم تصنيفها تحت الخاصية الخطرة HP1.

## 2.11.7 النفايات المؤكسدة

"يتم تصنيف النفايات على أنها نفايات خطيرة تحت الخاصية الخطرة HP2 إذا تم إثبات احتواء تلك النفايات على مادة أو أكثر مصنفة تحت أحد رموز بيانات المخاطر الآتية (ما لم يكن مولد النفايات قادر على إثبات غير ذلك عن طريق الاختبارات (انظر التذييل رقم (5) الفصل (9.2):

- H270
- H271
- "H272".

## 2.11.8 النفايات القابلة للاشتعال

"يتم تصنيف النفايات على أنها نفايات خطيرة تحت الخاصية الخطرة HP3 إذا تم إثبات احتواء تلك النفايات على مادة أو أكثر مصنفة تحت أحد رموز بيانات المخاطر الآتية (ما لم يكن مولد النفايات قادر على إثبات غير ذلك عن طريق الاختبارات أو الحسابات الرياضية (انظر التذييل رقم (5) الفصل (9.3):

- |        |        |
|--------|--------|
| • H220 | • H228 |
| • H221 | • H242 |
| • H222 | • H250 |
| • H223 | • H251 |

- H252
- H260
- H261
- H224
- H225
- H226

يمكن حساب قيمة حد التركيز للمواد التي تصنف تحت رموز بيان المخاطر H260 و H261. انظر المرفق رقم (5) الفصل (9.3).

النفايات الآتية تصنف على أنها نفايات خطرة:

1. **النفايات السائلة القابلة للاشتعال:** النفايات السائلة ذات نقطة الوميض تحت 60 درجة مئوية (أدنى درجة حرارة يمكن أن يشكل عندها السائل مزيج مع الهواء قابل للاشتعال) أو نفايات زيت الغاز والديزل وزيت التدفئة الخفيفة التي ذات نقطة وميض  $55 <$  درجة مئوية و  $75 \geq$  درجة مئوية.
2. **النفايات السائلة والصلبة ذاتية الاشتعال:** النفايات الصلبة أو السائلة التي تكون عرضة للاشتعال في غضون خمس دقائق من ملامستها للهواء، حتى وإن تواجدت بكميات قليلة.
3. **النفايات الصلبة القابلة للاشتعال:** النفايات الصلبة القابلة للاحتراق بسهولة أو قد تسبب أو تساهم في نشوب حريق من خلال الاحتكاك.
4. **النفايات الغازية القابلة للاشتعال:** النفايات الغازية القابلة للاشتعال في الهواء عند درجة حرارة 20 درجة مئوية وضغط قياسي يساوي 101.3 كيلو باسكال.
5. **النفايات المتفاعلة في الوسط المائي:** النفايات التي باتصالها مع الماء، تنبعث منها غازات قابلة للاشتعال بكميات خطرة.
6. **نفايات أخرى قابلة للاشتعال:** الهباء الجوي القابل للاشتعال (كبخاخات الهواء المضغوط)، والنفايات ذاتية التدفئة القابلة للاشتعال، والبيروكسيدات العضوية القابلة للاشتعال (المركبات العضوية الحاوية على مجموعة بيروكسيد في تركيبها الكيميائي)، والنفايات ذاتية التفاعل القابلة للاشتعال.
7. **تصنف المذيبات والمواد الصلبة العضوية إلى نفايات خطرة وفقاً للقائمة العمانية للنفايات الخطرة.** لذلك حتى في حال كانت نقطة الوميض للمذيب أعلى من درجة حرارة 60 درجة مئوية، فإنه يصنف إلى نفايات خطرة. كما يجب للنفايات الملوثة بمذيب عضوي أو مادة صلبة عضوية عدم إظهار أي من الخواص الخطرة HP1-HP15 قبل أن يتم تصنيفها إلى نفايات غير خطرة.

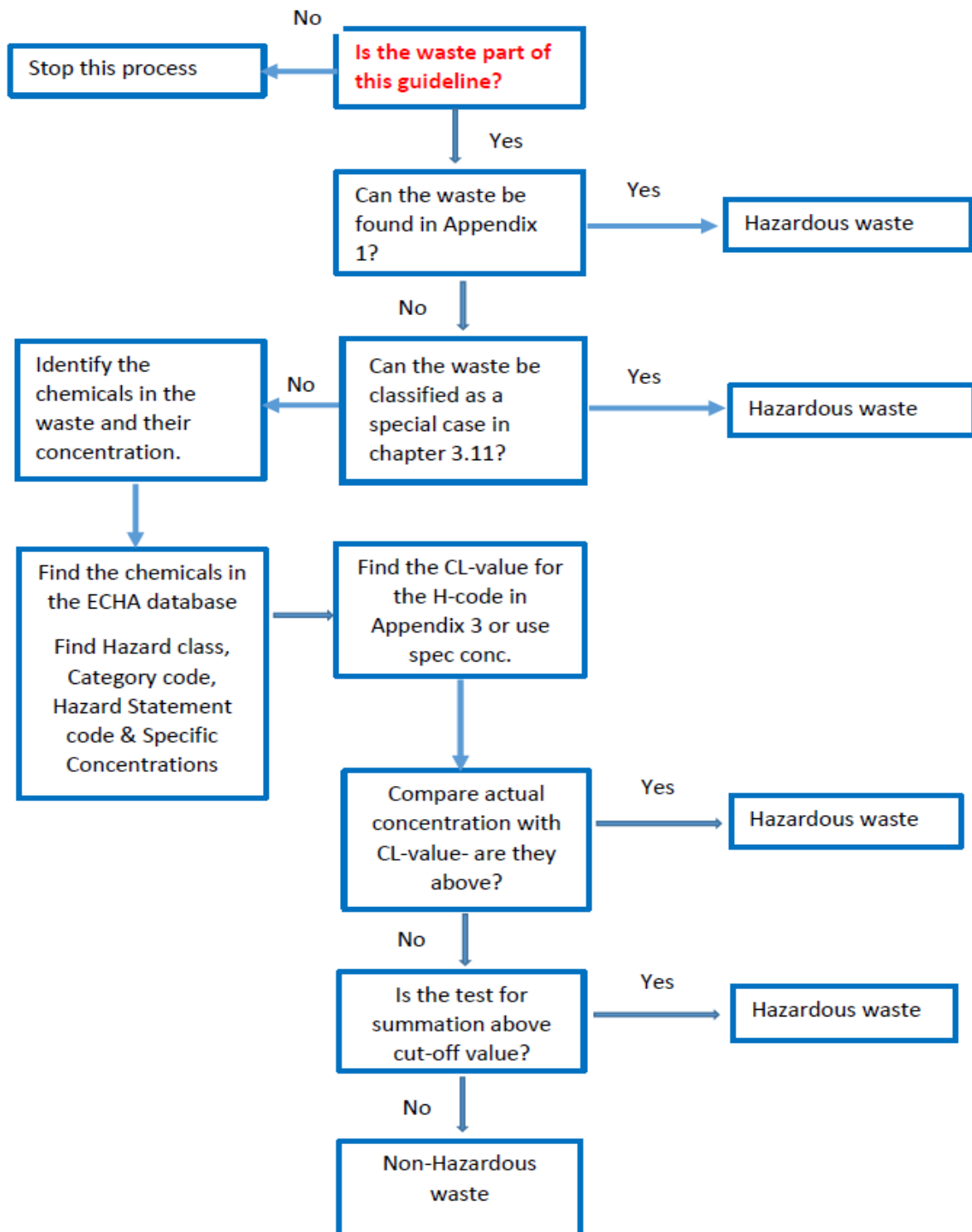
## 2.12 نهج عملي لتصنيف النفايات

عند تصنيف النفايات، يجب اتباع الآتي:

1. التحقق مما إذا كان يمكن العثور على النفايات في الملحق رقم (1) في القائمة العمانية للنفايات التي تعتبر نفايات خطرة مطلقاً.
2. تحديد المواد الكيميائية التي تجعل النفايات خطرة وتحديد تركيزها، ومن ثم تحديد نقطة الوميض وغيرها من الحقائق الضرورية.

3. البحث عن المواد الكيميائية في قاعدة بيانات وكالة المواد الكيميائية الأوروبية (ECHA) والعثور على فئة المخاطر ورمز الفئة ورمز بيان المخاطر لتلك المواد.
4. تحديد ما إذا كان هناك أي حد تركيز محدد لتلك المواد الكيميائية في قاعدة بيانات وكالة المواد الكيميائية الأوروبية (ECHA).
5. للمواد الكيميائية المصنفة تحت الخصائص الخطرة بدءاً من HP4 وحتى HP15 (ماعدا HP9)، يتم الرجوع للمرفق رقم (3) لتحديد التركيز الذي يجعل من تلك المواد خطرة بناءً على رمز المخاطر وفئة الخطر ورمز بيان المخاطر.
6. يجب التحقق مما إذا كانت النفايات المراد تصنيفها تقع ضمن الحالات الخاصة (المسمّات البيئية، المواد العضوية الثابتة POPs، هيدروكربونات، النفايات المعدية، النفايات المتفجرة، النفايات المؤكسدة، النفايات القابلة للاشتعال).
- انظر الفصل 3.11.
7. يجب استخدام أقل نسبة من التراكيز إن وجدت تحت إما 4 أو 5 أو 6 كقيمة حد تركيز.
8. قارن تركيزات المواد الكيميائية في النفايات مع قيم حد التركيز الموجودة تحت أيّاً من 4 أو 5 أو 6 لتحديد ما إذا كانت تلك النفايات خطرة أم لا.
9. أخيراً، إذا وجد أن النفايات غير خطرة، يجب حينها تحديد ما إذا كانت المواد الكيميائية المحددة في النفايات تخضع لقانون الجمع (انظر الفصول 3.8 و 3.9 و 3.10 المفصلة لقواعد الجمع)
- في الملحق رقم (5) يمكن العثور على ترجمة/ نسخة لدليل بيبرو الإرشادي (Bipro Guideline). وقد تم تغيير الوثيقة بصورة معينة لتجنب استخدام كتالوج النفايات الأوروبي مع الحفاظ على الإشارات المتعددة الأخرى لتشريعات الاتحاد الأوروبي ذات الصلة (مثل القانون الأوروبي للتصنيف والرميز والتعبئة والتعليق CLP). ويمكن استخدام دليل بيبرو الإرشادي كدليل مساعد في حال وجدت صعوبة في عملية التصنيف.

# Classification steps



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## Appendix 1: List of absolute hazardous waste

*NB: The sentence "Always (HW) unless proven different by HP1-HP15" means that as a rule of thumb this is hazardous waste, however there may be situations when the concentration or "nature" of that particular waste is so small that it does not deem the waste hazardous. Sometimes it may be in the economic interest of the Waste Generator to find out if a waste is really hazardous waste. In that case the waste is classified according to the rules described in "The Waste Classification Guideline" based on HP1-HP15.*

Table 1: List of "absolute" hazardous waste

| LEVEL 2 |                                   |    |                                            | LEVEL 3                        | Examples                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------|-----------------------------------|----|--------------------------------------------|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No      | Name                              | No | Limit                                      | Name                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| HW01    | Gaseous waste in pressure bottles | 10 | Always unless proven different by HP1-HP15 | Obsolete ozone depleting gases | CFCs, HCFCs, freons, halons, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|         |                                   | 20 | Always unless proven different by HP1-HP15 | Inorganic gases                | HCl, NH <sub>3</sub> , N <sub>2</sub> , Cl <sub>2</sub> , etc.                                                                                                                                                                                                                                                                                                                                                                                                                               |
|         |                                   | 30 | Always unless proven different by HP1-HP15 | Other gases                    | N <sub>2</sub> , CO <sub>2</sub> , CO, powder extinguisher, acetylene                                                                                                                                                                                                                                                                                                                                                                                                                        |
| HW02    | Oxidizing waste                   | 10 | Always unless proven different by HP1-HP15 | Solid oxidizing waste          | Bromates, chlorinated, isocyanurates, chlorates, chromates, dichromates, , hypochlorites, inorganic peroxides, ketone peroxides, nitrates, nitrites, perborates, perchlorates, periodates, permanganates, peroxides, , persulphates, • ammonium perchlorate (particle size greater than 15 microns), ammonium permanganate, iodates, red-lead, nitrite and nitrates-salts, aluminium chloride (water free), chlorosulphonic acid, ferric chloride (water free), phosphorus oxychloride, etc. |
|         |                                   | 20 | Always unless proven different by HP1-HP15 | Liquid oxidizing waste         | Bromine, nitric acid, perchloric acid, peroxyacids, hydroperoxides, , hydrogen peroxide (greater than 91% by weight), perchloric acid solutions (greater than 72.5% by weight), tetra-nitromethane, acetone-peroxide, acetyl-acetone-peroxide, cyclo-hexanon-peroxide, di-benzoyl-peroxide, methyl-ethyl ketone peroxide etc.                                                                                                                                                                |

| LEVEL 2 |                                |    |                                            | LEVEL 3                                                                | Examples                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------|--------------------------------|----|--------------------------------------------|------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No      | Name                           | No | Limit                                      | Name                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                            |
| HW03    | Reactive waste                 | 10 | Always unless proven different by HP1-HP15 | Waste developing acid fumes in contact with water                      | Thionyl Chloride (SOCl <sub>2</sub> ), lithium, sodium, potassium, rubidium, caesium, silicon tetrachloride, titanium tetrachloride etc.                                                                                                                                                                                                                                                                   |
|         |                                | 20 | Always unless proven different by HP1-HP15 | Waste developing flammable gases in contact with water                 | Carbides (e.g. Calcium carbide (CaC <sub>2</sub> ), Hydrides (e.g. Calcium hydride (CaH <sub>2</sub> ) etc.                                                                                                                                                                                                                                                                                                |
|         |                                | 30 | Always unless proven different by HP1-HP15 | Other reactive waste                                                   | 3-azidosulfonylbenzoic acid; a Type C organic azide, 2,2'-dimethyl-2,2'-azodipropionitrile (ADZN); a Type C organic azo compound, Hydrazine-trinitromethane; , fertilizer (NH <sub>4</sub> NO <sub>3</sub> ), fireworks<br><br>Reactive waste such as, phosphorus pentoxide, aluminium (powder), metal amides, chlorosilanes, ferrosilicon hydrides, lithium aluminium hydride, phosphides, silicides etc. |
| HW04    | Mercury containing waste       | 10 | ≥ 3 µg/kg                                  | Liquid waste containing mercury                                        | COD test liquids (Chemical Oxygen Demand) & other mercury containing test liquids                                                                                                                                                                                                                                                                                                                          |
|         |                                | 20 | >1 mg/kg                                   | Solid waste containing mercury                                         | Mercury treated seed grain, small packages of chemicals, thermometers, etc. Mixed battery types containing mercury                                                                                                                                                                                                                                                                                         |
|         |                                | 30 | Always unless proven different by HP1-HP15 | Fluorescent tubes and others containing Hg                             | Fluorescent tubes and lamps, sodium lamps etc. (Except Incandescent Bulbs, Halogen Bulbs) etc.                                                                                                                                                                                                                                                                                                             |
| HW05    | Iso-cyanate containing waste   | 10 | Always unless proven different by HP1-HP15 | Iso-cyanate containing waste                                           | Methylene diphenyl diisocyanate (MDI), toluene diisocyanate (TDI), etc.                                                                                                                                                                                                                                                                                                                                    |
| HW06    | Various waste (manual sorting) | 10 | Always unless proven different by HP1-HP15 | Pharmaceutical waste                                                   | Outdated medicine                                                                                                                                                                                                                                                                                                                                                                                          |
|         |                                | 20 | Always unless proven different by HP1-HP15 | Laboratory waste (small packaging with list of each single substance), | Out dated chemicals from laboratories                                                                                                                                                                                                                                                                                                                                                                      |

| LEVEL 2 |                                                                |    |                                             | LEVEL 3                                                                                  | Examples                                                                                                   |
|---------|----------------------------------------------------------------|----|---------------------------------------------|------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| No      | Name                                                           | No | Limit                                       | Name                                                                                     |                                                                                                            |
|         |                                                                | 30 | Always unless proven different by HP1-HP15  | Spray cans                                                                               | Spray cans (empty or full)                                                                                 |
|         |                                                                | 40 | Always unless proven different by HP1-HP15  | Low radioactive waste                                                                    | Scintillation waste                                                                                        |
|         |                                                                | 50 | Always unless proven different by HP1-HP15  | Others                                                                                   |                                                                                                            |
| HW07    | POP containing waste                                           | 10 | $\geq 50$ mg/kg                             | PCB containing waste (>50 mg/kg)                                                         | Capacitors containing PCB, transformers containing PCB, transformer oil etc.                               |
|         |                                                                | 20 | $\geq 50$ mg/kg                             | POP pesticides etc. containing waste                                                     | POP pesticides, Persistent Organic Pollutants e.g. fire retardants according to Stockholm convention. etc. |
|         |                                                                | 30 | $\geq 15$ $\mu$ g/kg                        | Waste containing polychlorinated dibenzo-p-dioxines and dibenzo-furans (PCDD's / PCDF's) |                                                                                                            |
| HW08    | Pesticide containing waste excluding POP containing pesticides | 10 | Always unless proven different by HP1-HP15  | Liquid pesticides waste                                                                  |                                                                                                            |
|         |                                                                | 20 | Always unless proven different by HP1-HP15  | Solid pesticide waste                                                                    |                                                                                                            |
|         |                                                                | 30 | Always unless proven different by HP1-HP15s | Empty pesticides containers                                                              |                                                                                                            |
|         |                                                                | 40 | Always unless proven different by HP1-HP15s | Other pesticide containing waste                                                         |                                                                                                            |
| HW09    | Batteries                                                      | 10 | Always                                      | Lead acid batteries                                                                      | Lead batteries, lead batteries paste                                                                       |
|         |                                                                | 20 | Always                                      | Batteries for recycling                                                                  | Ni/Cd batteries etc                                                                                        |
|         |                                                                | 30 | Always unless proven different by HP1-HP15  | Other batteries                                                                          |                                                                                                            |

| LEVEL 2 |                                                  |    |                                            | LEVEL 3                                                                                                                                                                | Examples                                                                                                                                                                                                                                                                                                                                                    |
|---------|--------------------------------------------------|----|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No      | Name                                             | No | Limit                                      | Name                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                             |
| HW10    | Inorganic chemical waste                         | 10 | Always unless proven different by HP1-HP15 | Liquid and sludge inorganic waste                                                                                                                                      | Liquid acidic waste (pickling acids, chrome sulphur acids, chrome acids, ferrous and ferric chloride solutions, hydrofluoric acid, galvanic baths, $H_3PO_4$ , $HNO_3$ , $HCl$ , $H_2SO_4$ ), liquid basic inorganic waste without cyanide (Hypochlorite solutions, metal hydroxide sludges, $NaOH$ ), alkaline inorganic waste with cyanide ( $pH > 10$ ), |
|         |                                                  | 20 | Always unless proven different by HP1-HP15 | Solid inorganic waste                                                                                                                                                  | Filter cakes, waste gypsum, hardening salts containing $NaCN$ , and $Ba(CN)_2$ , inorganic salts, inorganic wood-preserving chemicals, inorganic waste catalysts, borates, etc.                                                                                                                                                                             |
| HW11    | Tarry & bitumen containing waste                 | 10 | Always unless proven different by HP1-HP15 | Tar containing waste. If the concentration of benzo[a]pyrene is at or above 50 ppm (mg/kg) e.g. in the asphalt concrete alone (excluding other material) then it is HW | Waste from coal based generated tar                                                                                                                                                                                                                                                                                                                         |
|         |                                                  | 20 | Always unless proven different by HP1-HP15 | Bitumen containing waste                                                                                                                                               | Waste from petroleum based manufactured bitumen                                                                                                                                                                                                                                                                                                             |
|         |                                                  | 30 | Always unless proven different by HP1-HP15 | Others                                                                                                                                                                 | e.g. pitch tar                                                                                                                                                                                                                                                                                                                                              |
| HW12    | Organic solvents containing halogens and sulphur | 10 | Always unless proven different by HP1-HP15 | Solvents containing halogens and/or sulphur                                                                                                                            | Chloroform, $CS_2$ , chlorethene, Freon, methylene chloride, perchlorethane, tetrachloro-methane, trichloromethane, trichloroethylene, cutting oil and drilling oil containing more than 1 % of halogen and sulphur, halogen containing glue waste, waste from dry cleaning companies etc.                                                                  |
|         |                                                  | 20 | Always unless proven different by HP1-HP15 | Others containing halogens and/or sulphur                                                                                                                              | Liquids (polluted water) and liquid sludge* of organic chemical waste with halogens and sulphur. Waste waters containing more than 1 % halogen and/or sulphur                                                                                                                                                                                               |

| LEVEL 2 |                                                |    |                                            | LEVEL 3                                                                                                            | Examples                                                                                                                                                                                                                                                                                                                                   |
|---------|------------------------------------------------|----|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No      | Name                                           | No | Limit                                      | Name                                                                                                               |                                                                                                                                                                                                                                                                                                                                            |
| HW13    | Organic solvents without halogens and sulphur  | 10 | Always unless proven different by HP1-HP15 | Solvents without halogens and sulphur                                                                              | Acetone, alcohols, oil from animals, benzene, petrol, butyl acetate, ether, ethyl acetate, thinner, hexane, methyl ethyl ketone, methyl isobutyl ketone, oil emulsions, petroleum ether, styrene, synthetic oils, turpentine, toluene, vegetable oil, xylene                                                                               |
|         |                                                | 20 | Always unless proven different by HP1-HP15 | Liquids (polluted water) and liquid sludge* of organic chemical waste without halogens and sulphur (less than 1 %) | Waste waters with among others: acetic acids, organic acids, amines, degreasing baths, cutting oil and drilling oil, brake wash waters, ethylene glycol, formalin, paint, alkaline bath from acid washing, oil emulsions, phenols, polyols, synthetic oils, soap, tectyl corrosion prevention, printing ink, fixing baths, developers etc. |
|         |                                                | 30 | Always unless proven different by HP1-HP15 | Others without halogen or sulphur                                                                                  |                                                                                                                                                                                                                                                                                                                                            |
| HW14    | Organic solids containing halogens and sulphur | 10 | Always unless proven different by HP1-HP15 | Solids containing halogens and/or sulphur                                                                          | Solids containing halogens and/or sulphur waste.                                                                                                                                                                                                                                                                                           |
|         |                                                | 20 | Always unless proven different by HP1-HP15 | Spent pot lining (organic solid) containing halogens                                                               | Spent pot liner containing organic fractions, e.g. mixed with organic carbon, containing Fluoride and Cyanide                                                                                                                                                                                                                              |
|         |                                                | 30 | Always unless proven different by HP1-HP15 | Others containing halogens and/or sulphur                                                                          |                                                                                                                                                                                                                                                                                                                                            |
| HW15    | Organic solids without halogens and sulphur    | 10 | Always unless proven different by HP1-HP15 | Solid organic chemical waste (including solid sludge*) without halogen or sulphur                                  | Only after individual evaluation - Filters, cup grease, lubricants, latex, glue, organic salts, organic wood-preserving chemicals, reactive waste such as fertilizer (NH <sub>4</sub> NO <sub>3</sub> ), fireworks laboratory waste, spray cans, empty containers, leaded anti-knock compound sludges, waste leather dust, etc             |
|         |                                                | 20 | Always unless proven different by HP1-HP15 | (Polluted rags, paint containers etc.) without halogen or sulphur                                                  | Polluted rags, paint containers etc.)                                                                                                                                                                                                                                                                                                      |

| LEVEL 2 |                                           |    |                                                                                 | LEVEL 3                                 | Examples                                                                            |
|---------|-------------------------------------------|----|---------------------------------------------------------------------------------|-----------------------------------------|-------------------------------------------------------------------------------------|
| No      | Name                                      | No | Limit                                                                           | Name                                    |                                                                                     |
|         |                                           | 30 | Always unless proven different by HP1-HP15                                      | Others without halogen or sulphur       |                                                                                     |
| HW16    | Oil Waste – Liquid and Solid <sup>2</sup> | 10 | Above 1 % TOC - Always unless proven different by HP1-HP15                      | Lubricant waste oil                     | Lubricating oil, oil from oil and petrol traps, heat transmission oils (no PCB) etc |
|         |                                           | 20 | Above 1 % TOC - Always unless proven different by HP1-HP15                      | Other liquid waste oil                  | Diesel oil, fuel oil, heating oil, gas oil, hydraulic oil                           |
|         |                                           | 30 | Above 1 % TOC - Always unless proven different by HP1-HP15. See also footnote 2 | Solid oily waste                        | Oily sludge's                                                                       |
|         |                                           | 40 | Always unless proven different by HP1-HP15                                      | Polluted material (not soil)            | oil filters, oily rags etc.                                                         |
| HW17    | Mineral waste                             | 10 | Always unless proven different by HP1-HP15                                      | Foundry sand                            |                                                                                     |
|         |                                           | 20 | Always unless proven different by HP1-HP15                                      | Blasting waste                          |                                                                                     |
|         |                                           | 30 | Always unless proven different by HP1-HP15                                      | Refractory waste                        |                                                                                     |
|         |                                           | 40 | Always unless proven different by HP1-HP15                                      | Tailing waste                           |                                                                                     |
|         |                                           | 50 | Always unless proven different by HP1-HP15                                      | Oil polluted soil (more than 500 mg/kg) |                                                                                     |

<sup>2</sup> Oil in waste  $\leq 0.05$  % is inert waste according to the Landfill Acceptance Criteria. Oil in waste  $\geq 1$  % is hazardous waste according to this guideline. Thus Oil in waste  $\geq 0.05$  % but  $\leq 1$  % is non-hazardous waste and may be treated as MW.

| LEVEL 2 |                                                   |    |                                            | LEVEL 3                          | Examples                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------|---------------------------------------------------|----|--------------------------------------------|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No      | Name                                              | No | Limit                                      | Name                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|         |                                                   | 60 | Always unless proven different by HP1-HP15 | Other mineral waste              | Sandblast sand, dust from grinding (may contain heavy metals and/or paint residue etc)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| HW18    | Waste of Electric and Electronic Equipment (WEEE) | 10 | Always                                     | White goods                      | Washing machines, Dryers, Refrigerators, Air-conditioners, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|         |                                                   | 20 | Always                                     | Mobile phones                    | Mobile phones                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|         |                                                   | 30 | Always                                     | Monitors containing CRT tubes    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|         |                                                   | 40 | Always                                     | Other WEEE                       | Vacuum cleaners, Coffee Machines, Irons, Toasters, etc. PCs, Laptops, Telephones, Fax Machines, Copiers, Printers etc. Televisions, VCR/DVD/CD players, Hi-Fi sets, Radios, etc., and Electric train sets, coin slot machines, treadmills etc., and Vending machines, parking ticket equipment etc. Drills, Electric saws, Sewing Machines, Lawn Mowers etc. (Except: large stationary tools/machines) etc. Surveillance and Control Equipment (e.g. CCTV cameras, scanning equipment), and Medical Instruments and Equipment (e.g. x-ray and heart lung machines) etc |
| HW19    | Healthcare Waste                                  | 10 | Always                                     | Infectious waste and sharps      | Non-anatomical                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|         |                                                   | 20 | Always                                     | Pathological waste               | Human and animal anatomical waste                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|         |                                                   | 30 | Always                                     | Genotoxic waste                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|         |                                                   | 40 | Always                                     | Others                           | Biological laboratory waste                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| HW20    | Shredder waste                                    | 10 | Always unless proven different by HP1-HP15 | Shredder waste from cars (fluff) |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|         |                                                   | 20 | Always unless proven different by HP1-HP15 | Other shredder waste             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| HW21    | Asbestos waste                                    | 10 | Always unless proven different by HP1-HP15 | Dusty asbestos waste             | Asbestos from insulation, buildings etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

| LEVEL 2 |                                                    |    |                                            | LEVEL 3                                                                         | Examples                                                  |
|---------|----------------------------------------------------|----|--------------------------------------------|---------------------------------------------------------------------------------|-----------------------------------------------------------|
| No      | Name                                               | No | Limit                                      | Name                                                                            |                                                           |
|         |                                                    | 20 | Always unless proven different by HP1-HP15 | Other asbestos waste (unless otherwise proved non-hazardous (accepted by MECA)) |                                                           |
| HW22    | Fly ash and dust from miscellaneous filter sources | 10 | Always unless proven different by HP1-HP15 | Fly ash                                                                         | Dusts and residues from dry gas cleaning systems etc.     |
|         |                                                    | 20 | Always unless proven different by HP1-HP15 | Fly ash others (unless otherwise proved non-hazardous (accepted by MECA))       |                                                           |
| HW23    | Bottom ash                                         | 10 | Always unless proven different by HP1-HP15 | Bottom ash (unless otherwise proved non-hazardous (accepted by MECA))           | Residue from power generation, boilers, incinerators etc. |
| HW24    | Slag                                               | 10 | Always unless proven different by HP1-HP15 | Copper slag                                                                     | Copper slag                                               |
|         |                                                    | 20 | Always unless proven different by HP1-HP15 | Chromite slag                                                                   | Chrome slag                                               |
|         |                                                    | 30 | Always unless proven different by HP1-HP15 | Other slag                                                                      | Steel slag, manganese, vanadium, silica etc.              |
| HW25    | Contaminated wood                                  | 10 | Always unless proven different by HP1-HP15 | Contaminated wood (creosote always, As >0.1 % w/w)                              |                                                           |
| HW99    | Other                                              | 10 | Always unless proven different by HP1-HP15 | Other hazardous waste                                                           |                                                           |

## Appendix 2: Hazardous Properties List

| Hazardous properties |                                                                                                            |
|----------------------|------------------------------------------------------------------------------------------------------------|
| HP1                  | Explosive                                                                                                  |
| HP2                  | Oxidising                                                                                                  |
| HP3                  | Flammable                                                                                                  |
| HP4                  | Irritant – skin irritation and eye damage                                                                  |
| HP5                  | Specific Target Organ Toxicity (STOT)/ Aspiration Toxicity                                                 |
| HP6                  | Acute Toxicity                                                                                             |
| HP7                  | Carcinogenic                                                                                               |
| HP8                  | Corrosive                                                                                                  |
| HP9                  | Infectious                                                                                                 |
| HP10                 | Toxic for reproduction                                                                                     |
| HP11                 | Mutagenic                                                                                                  |
| HP12                 | Release of an acute toxic gas                                                                              |
| HP13                 | Sensitising                                                                                                |
| HP14                 | Eco-toxic                                                                                                  |
| HP15                 | Waste capable of exhibiting a hazardous property listed above not directly displayed by the original waste |

Table 2: Hazardous Properties List

## Appendix 3 Concentration Limit values and cut-off values

Table 3: **List A:** Concentration Limit values (CLV) and (for those to be summed) cut-off values listed by property

| Hazard classes and category codes                                      | Hazard statement codes | CLV (%) | CLV (mg/kg)   | Type | Cut-off value for summation, % | Should summation be used?                  |
|------------------------------------------------------------------------|------------------------|---------|---------------|------|--------------------------------|--------------------------------------------|
| <b>HP 4 Irritant – skin irritation and eye damage</b>                  |                        |         |               |      |                                |                                            |
| Skin corr. 1A                                                          | H314                   | 1-5     | 10.000-50.000 | HP4  | 1                              | Yes and with Skin corr. 1B og 1C under HP8 |
| Eydam. 1                                                               | H318                   | 10      | 100.000       | HP4  | 1                              | Yes                                        |
| Skin irrit. 2                                                          | H315                   | 20      | 200.000       | HP4  | 1                              | Yes and with Eye irrit. 2                  |
| Eye irrit. 2                                                           | H319                   | 20      | 200.000       | HP4  | 1                              | Yes and with Skin irrit. 2                 |
| <b>HP 5 Specific Target Organ Toxicity (STOT)/ Aspiration Toxicity</b> |                        |         |               |      |                                |                                            |
| STOT SE 1                                                              | H370                   | 1       | 10.000        | HP5  |                                | No                                         |
| STOT SE 2                                                              | H371                   | 10      | 100.000       | HP5  |                                | No                                         |
| STOT SE 3                                                              | H335                   | 20      | 200.000       | HP5  |                                | No                                         |
| STOT RE1                                                               | H372                   | 1       | 10.000        | HP5  |                                | No                                         |
| STOT RE2                                                               | H373                   | 10      | 100.000       | HP5  |                                | No                                         |
| Asp. Tox. 1                                                            | H304                   | 10      | 100.000       | HP5  |                                | Yes                                        |
| <b>HP 6 Acute Toxicity</b>                                             |                        |         |               |      |                                |                                            |
| Acute Tox. 1 (Oral)                                                    | H300                   | 0,1     | 1.000         | HP6  | 0,1                            | Yes                                        |
| Acute Tox. 2 (Oral)                                                    | H300                   | 0,25    | 2.500         | HP6  | 0,1                            | Yes                                        |
| Acute Tox. 3(Oral)                                                     | H301                   | 5       | 50.000        | HP6  | 0,1                            | Yes                                        |
| Acute Tox. 4 (Oral)                                                    | H302                   | 25      | 250.000       | HP6  | 1                              | Yes                                        |
| Acute Tox. 1 (Dermal)                                                  | H310                   | 0,25    | 2.500         | HP6  | 0,1                            | Yes                                        |

| Hazard classes and category codes   | Hazard statement codes | CLV (%) | CLV (mg/kg) | Type | Cut-off value for summation, % | Should summation be used?        |
|-------------------------------------|------------------------|---------|-------------|------|--------------------------------|----------------------------------|
| Acute Tox. 2 (Dermal)               | H310                   | 2,5     | 25.000      | HP6  | 0,1                            | Yes                              |
| Acute Tox. 3 (Dermal)               | H311                   | 15      | 150.000     | HP6  | 0,1                            | Yes                              |
| Acute Tox. 4 (Dermal)               | H312                   | 55      | 550.000     | HP6  | 1                              | Yes                              |
| Acute Tox. 2 (Inhal.)               | H330                   | 0,5     | 5.000       | HP6  | 0,1                            | Yes                              |
| Acute Tox. 3 (Inhal.)               | H331                   | 3,5     | 35.000      | HP6  | 0,1                            | Yes                              |
| Acute Tox. 4 (Inhal.)               | H332                   | 22,5    | 225.000     | HP6  | 1                              | Yes                              |
| <b>HP 7 Carcinogenic</b>            |                        |         |             |      |                                |                                  |
| Carc. 1A                            | H350                   | 0,1     | 1.000       | HP7  |                                | No                               |
| Carc. 1B                            | H350                   | 0,1     | 1.000       | HP7  |                                | No                               |
| Carc. 2                             | H351                   | 1       | 10.000      | HP7  |                                | No                               |
| <b>HP 8 Corrosive</b>               |                        |         |             |      |                                |                                  |
| Skin corr. 1A                       | H314                   | 5       | 50.000      | HP8  | 1                              | Yes and with Skin corr. 1B og 1C |
| Skin corr. 1B                       | H314                   | 5       | 50.000      | HP8  | 1                              | Yes and with Skin corr. 1A og 1C |
| Skin corr. 1C                       | H314                   | 5       | 50.000      | HP8  | 1                              | Yes and with Skin corr. 1A og 1B |
| <b>HP 10 Toxic for reproduction</b> |                        |         |             |      |                                |                                  |
| Repr. 1A                            | H360                   | 0,3     | 3.000       | HP10 |                                | No                               |
| Repr. 1B                            | H360                   | 0,3     | 3.000       | HP10 |                                | No                               |
| Repr. 2                             | H361                   | 3       | 30.000      | HP10 |                                | No                               |
| <b>HP 11 Mutagenic</b>              |                        |         |             |      |                                |                                  |
| Muta. 1A                            | H340                   | 0,1     | 1.000       | HP11 |                                | No                               |
| Muta. 1B                            | H340                   | 0,1     | 1.000       | HP11 |                                | No                               |

| Hazard classes and category codes | Hazard statement codes | CLV (%) | CLV (mg/kg) | Type | Cut-off value for summation, % | Should summation be used? |
|-----------------------------------|------------------------|---------|-------------|------|--------------------------------|---------------------------|
| Muta. 2                           | H341                   | 1       | 10.000      | HP11 |                                | No                        |
|                                   |                        |         |             |      |                                |                           |
| <b>HP 13 Sensitising</b>          |                        |         |             |      |                                |                           |
| Skin Sens. 1                      | H317                   | 10      | 100.000     | HP13 |                                | No                        |
| Resp. Sens. 1                     | H334                   | 10      | 100.000     | HP13 |                                | No                        |
|                                   |                        |         |             |      |                                |                           |
| <b>HP14 Ecotoxic</b>              |                        |         |             |      |                                |                           |
| Aquatic Acute 1                   | H400                   | 25      | 250000      | HP14 | 0.1                            | Yes                       |
| Aquatic Chronic 1                 | H410                   | 0.25    | 2500        | HP14 | 0.1                            | Yes                       |
| Aquatic Chronic 2                 | H411                   | 2.5     | 25000       | HP14 | 1                              | Yes                       |
| Aquatic Chronic 3                 | H412                   | 25      | 250000      | HP14 | 1                              | Yes                       |
| Aquatic Chronic 4                 | H413                   | 25      | 250000      | HP14 | 1                              | Yes                       |
| Ozone 1                           | H420                   | 0.1     | 1000        | HP14 |                                | No                        |

Table 4: **List B:** Concentration Limit values listed for 'dangerousness', ranked with the low value first

| Hazard classes and category codes | Hazard statement codes | CLV (%) | CLV (mg/kg) | Type | Cut-Off value for summation % | Should summation be used?         |
|-----------------------------------|------------------------|---------|-------------|------|-------------------------------|-----------------------------------|
| Acute Tox. 1 (Oral)               | H300                   | 0,1     | 1.000       | HP6  | 0,1                           | Yes                               |
| Acute Tox. 1 (Inhal.)             | H330                   | 0,1     | 1.000       | HP6  | 0,1                           | Yes                               |
| Carc. 1A                          | H350                   | 0,1     | 1.000       | HP7  |                               | No                                |
| Carc. 1B                          | H350                   | 0,1     | 1.000       | HP7  |                               | No                                |
| Muta. 1A                          | H340                   | 0,1     | 1.000       | HP11 |                               | No                                |
| Muta. 1B                          | H340                   | 0,1     | 1.000       | HP11 |                               | No                                |
| Ozone 1                           | H420                   | 0,1     | 1000        | HP14 |                               | No                                |
| Acute Tox. 2 (Oral)               | H300                   | 0,25    | 2.500       | HP6  | 0,1                           | Yes                               |
| Acute Tox. 1 (Dermal)             | H310                   | 0,25    | 2.500       | HP6  | 0,1                           | Yes                               |
| Aquatic Chronic 1                 | H410                   | 0,25    | 2500        | HP14 | 0,1                           | Yes                               |
| Repr. 1A                          | H360                   | 0,3     | 3.000       | HP10 |                               | No                                |
| Repr. 1B                          | H360                   | 0,3     | 3.000       | HP10 |                               | No                                |
| Acute Tox. 2 (Inhal.)             | H330                   | 0,5     | 5.000       | HP6  | 0,1                           | Yes                               |
| Skin corr. 1A                     | H314                   | 1       | 10.000      | HP4  | 1                             | Yes                               |
| STOT SE 1                         | H370                   | 1       | 10.000      | HP5  |                               | No                                |
| STOT RE1                          | H372                   | 1       | 10.000      | HP5  |                               | No                                |
| Carc. 2                           | H351                   | 1       | 10.000      | HP7  |                               | No                                |
| Muta. 2                           | H341                   | 1       | 10.000      | HP11 |                               | No                                |
| Acute Tox. 2 (Dermal)             | H310                   | 2,5     | 25.000      | HP6  | 0,1                           | No                                |
| Aquatic Chronic 2                 | H411                   | 2,5     | 25000       | HP14 | 1                             | Yes                               |
| Repr. 2                           | H361                   | 3       | 30.000      | HP10 |                               | No                                |
| Acute Tox. 3 (Inhal.)             | H331                   | 3,5     | 35.000      | HP6  | 0,1                           | Yes                               |
| Acute Tox. 3(Oral)                | H301                   | 5       | 50.000      | HP6  | 0,1                           | Yes                               |
| Skin corr. 1B                     | H314                   | 5       | 50.000      | HP8  | 1                             | Yes and with Skin corr. 1A and 1C |
| Skin corr. 1C                     | H314                   | 5       | 50.000      | HP8  | 1                             | Yes and with Skin corr. 1A and 1B |
| Eydam. 1                          | H318                   | 10      | 100.000     | HP4  | 1                             | Yes                               |
| STOT SE 2                         | H371                   | 10      | 100.000     | HP5  |                               | No                                |
| STOT RE2                          | H373                   | 10      | 100.000     | HP5  |                               | No                                |

| Hazard classes and category codes | Hazard statement codes | CLV (%) | CLV (mg/kg) | Type | Cut-Off value for summation % | Should summation be used?  |
|-----------------------------------|------------------------|---------|-------------|------|-------------------------------|----------------------------|
| Asp. Tox. 1                       | H304                   | 10      | 100.000     | HP5  |                               | Yes                        |
| Skin Sens. 1                      | H317                   | 10      | 100.000     | HP13 |                               | No                         |
| Resp. Sens. 1                     | H334                   | 10      | 100.000     | HP13 |                               | No                         |
| Acute Tox. 3 (Dermal)             | H311                   | 15      | 150.000     | HP6  | 0,1                           | Yes                        |
| Skin irrit. 2                     | H315                   | 20      | 200.000     | HP4  | 1                             | Yes and with Eye irrit. 2  |
| Eye irrit. 2                      | H319                   | 20      | 200.000     | HP4  | 1                             | Yes and with Skin irrit. 2 |
| STOT SE 3                         | H335                   | 20      | 200.000     | HP5  |                               | No                         |
| Acute Tox. 4 (Inhal.)             | H332                   | 22,5    | 225.000     | HP6  | 1                             | Yes                        |
| Acute Tox. 4 (Oral)               | H302                   | 25      | 250.000     | HP6  | 1                             | Yes                        |
| Aquatic Acute 1                   | H400                   | 25      | 250000      | HP14 | 0.1                           | Yes                        |
| Aquatic Chronic 3                 | H412                   | 25      | 250000      | HP14 | 1                             | Yes                        |
| Aquatic Chronic 4                 | H413                   | 25      | 250000      | HP14 | 1                             | Yes                        |
| Acute Tox. 4 (Dermal)             | H312                   | 55      | 550.000     | HP6  | 1                             | Yes                        |

## Appendix 4: Understanding the CL-Inventory

When making a search in the CL Inventory, one can choose to put a tic in the field for “only search for harmonised classification and labelling”. This is giving you the results from the EU-CLP-regulation (which – as said – are the *harmonised* classifications, which means they are agreed by EU-law).

If one ‘un-tic’, you will get also all the *intermediate* results from the negotiations between those responsible for bringing a specific substance to the market, and who due to the EU-REACH-regulation is obliged to do such negotiations on basis of all their individual investigations on that substance (which means that you will get all information pooled and thereby optimized the evidence for final decision). When negotiations are finalized, the Commission will adopt a harmonized classification at that time (and put it into force by an amendment to the CLP-regulation). Until then you would often find different proposals for classification for the same substance – depending on the research in different companies etc.

If there are ‘No results’ when you tic ‘only search for harmonized classification and labeling’, the recommendation would be to try with an ‘un-tic’ and then bring in the precautionary principle in choosing the classification from the intermediate list – which means to pick the classification with the lowest resulting concentration limit. BUT be aware that this could change when final adoption takes place. Furthermore if the results seems wrong always cross check with other sources before dooming a waste as hazardous.

As the result may be wrong in the *intermediate list*, it is recommended always to make a remark when classification is done on basis of intermediate classification (not yet harmonized). When coming back to such a substance later on, you would always know, that you better check whether a final decision has been taken and a harmonized classification has been adopted.

Sometimes even the ‘un-tic’ does not give a result, and then it can be advised to search for MSDS or SDS in google to try to find a Hazard Statement Code or an old EU-classification code that can be translated into a hazard statement code.

It is sometimes difficult to find an EU approved hazard statement code, however if there is anything that’s indicate that a substance can be a hazardous waste it shall be treated as such in Oman in order to let people and environment experience the benefit of the doubt.

It is better to treat a non-hazardous waste as a hazardous waste than to treat a hazardous waste as a non-hazardous waste

## Appendix 5: The Bipro Guidance Document Modified for use in Sultanate of Oman

### 1. Introduction

This Guidance document has been developed during 2016 and is meant to provide assistance to actors in the field of (hazardous) waste management regarding the complex issue of the definition and classification of waste in the Sultanate of Oman. The Guidance is an extract of the Bipro report from 2015 /9/. In this extract all the discussion of EU legislation and especially the references to the EU Waste Catalogue has been removed as this is not a methodology used in Oman.

### 2. Executive Summary

Waste management is a key area in moving towards a circular economy and bringing together the overall aims of a secure access to resources, societal welfare, economic growth and environmental protection. The waste management industry enables the use of waste as a resource as well as the ability to recover raw materials from waste. Concurrently, health and environmental impacts from waste management need to be considered. In particular regarding hazardous waste, the question whether the advantages of recycling are outweighed by unwanted transfers and perpetuation of hazardous substances in certain material cycles needs to be carefully considered and offers difficult challenges for regulators, authorities and economic actors. To be able to properly define whether waste is hazardous, and to properly classify waste, is a key task in this context for competent authorities, waste generators and waste holders.

### 3. List of Abbreviations

|                     |                                                                                                                         |
|---------------------|-------------------------------------------------------------------------------------------------------------------------|
| ABANDA              | Database on waste analyses ('Abfallanalysendatenbank')                                                                  |
| AH                  | Absolute Hazardous Entry                                                                                                |
| ANH                 | Absolute Non-Hazardous Entry                                                                                            |
| ATP                 | Adaption to Technical Progress                                                                                          |
| BDE                 | Brominated diphenyl ethers                                                                                              |
| BREF                | Best Available Techniques Reference Document                                                                            |
| BTEX                | Benzene, Toluene, Ethylbenzene and Xylene                                                                               |
| CaO                 | Calcium oxide                                                                                                           |
| Ca(OH) <sub>2</sub> | Calcium hydroxide                                                                                                       |
| CEN                 | European Committee for Standardization                                                                                  |
| CJEU                | Court of Justice of the European Union                                                                                  |
| C&L                 | Classification & Labelling                                                                                              |
| CLP                 | Classification, Labelling and Packaging                                                                                 |
| CLRTAP              | Convention on Long-Range Transboundary Air Pollution                                                                    |
| ECHA                | European Chemicals Agency                                                                                               |
| EEA                 | European Environmental Agency                                                                                           |
| ELV                 | End of life vehicles                                                                                                    |
| ETDS                | Environmental Terminology and Discovery Service                                                                         |
| EU                  | European Union                                                                                                          |
| GHS                 | Globally Harmonised System                                                                                              |
| HP                  | Hazardous Property                                                                                                      |
| ICP-MS              | Inductively Coupled Plasma Mass Spectrometry                                                                            |
| LANUV               | Environment Agency of North Rhine-Westphalia ('Landesamt für Natur, Umwelt und Verbraucherschutz' Nordrhein-Westfalen') |
| LoW                 | List of Waste (Decision 2000/532/EC, as amended)                                                                        |
| MH                  | Mirror Hazardous Entry                                                                                                  |
| MNH                 | Mirror Non-Hazardous Entry                                                                                              |
| MS                  | (EU) Member State                                                                                                       |
| ODS                 | Ozone depleting substances                                                                                              |
| OSHA                | Occupational Safety & Health Administration                                                                             |
| PAH                 | Polycyclic Aromatic Hydrocarbons                                                                                        |
| SDS                 | Safety Data Sheet                                                                                                       |
| TOC                 | Total Organic Carbon                                                                                                    |
| UN                  | United Nations                                                                                                          |
| UNECE               | United Nations Economic Commission for Europe                                                                           |
| UNEP                | United Nations Environment Programme                                                                                    |
| US                  | United States                                                                                                           |
| WEEE                | Waste electrical and electronic equipment                                                                               |
| WFD                 | Waste Framework Directive (2008/98/EC)                                                                                  |
| WHO                 | World Health Organization                                                                                               |

## 4. Glossary

**Cut-off value:** Where a substance is present in the waste at a concentration below a given numerical value (i.e. its cut-off value), it shall not be considered towards the calculations for comparison against the specific thresholds (concentration limits) for assigning the relevant hazard properties, indicated in Annex III to the WFD (see Appendix 5 chapter 15). Cut-off values to be applied for certain HP codes are indicated in this same annex.

**M-factor:** M-factor means a multiplying factor. It is applied to the concentration of a substance classified as hazardous to the aquatic environment acute category 1 or chronic category 1, and is used to derive by the summation method the classification of a mixture in which the substance is present.

**Harmonised classification:** For some substances the decision on the classification of the chemical is officially taken at EU level. This classification can be found in Table 3.1 of Part 3 of Annex VI to the CLP Regulation. It is mandatory also in Oman to apply this harmonised classification and to keep an updated version of the harmonised classification.

**Self-classification:** In absence of a harmonised classification, manufacturers, importers and downstream users have to self-classify the chemicals according to the CLP Regulation.

**Hazardous waste:** Hazardous waste means waste which displays one or more of the hazardous properties (HP) listed in Annex III to the WFD.

**Hazardous property (HP):** HPs are properties of waste which render it hazardous. There are 15 HPs described in Annex III to the WFD. In some cases hazardous properties of waste are assessed based on the properties and concentrations of the hazardous substances contained in the waste.

**Substance:** Substance means according to the definition of the REACH Regulation a chemical element and its compounds in the natural state or obtained by any manufacturing process, including any additive necessary to preserve its stability and any impurity deriving from the process used, but excluding any solvent which may be separated without affecting the stability of the substance or changing its composition.

**Mixture:** Mixture means according to the definition of the REACH Regulation a mixture or solution composed of two or more substances.

**Article:** Article means according to the definition of EU REACH Regulation an object which during production is given a special shape, surface or design which determines its function to a greater degree than does its chemical composition.

**Hazardous substance:** A substance or a mixture fulfilling the criteria relating to physical hazards, health hazards or environmental hazards, laid down in this Appendix 5 of the Guideline is hazardous and shall be classified in relation to the respective hazard classes provided for in this Annex.

**Hazard Statement Code:** A hazard statement code is a phrase assigned to a hazard class and category that describes the nature of the hazards of a hazardous substance or mixture, including, where appropriate, the degree of hazard. For example a carcinogenic substance could be assigned with 'H350' or 'H351'.



**Hazard Class:** Hazard class means the nature of the hazard. For example a carcinogenic substance is defined by 'Carc.'

**Hazard Category:** Hazard category means a sub-category of the hazard class that describes the severity of the hazard. For example a carcinogen could be '1A', '1B' or '2'.

## 5. Introduction

### 5.1. Background

Waste management is becoming increasingly sophisticated and complex. In the same time, the knowledge on waste generation, waste properties and waste management has been vastly improved during the last 40 years.

Further, the waste management industry today is a fast-growing innovative sector, developing new treatment technologies or using existing technologies (including pre-treatment) much more efficiently. These changes provide many specific solutions, enabling the use of waste as a resource as well as the ability to recover raw materials from waste on many occasions. In this respect, the management of waste, including hazardous waste, offers many opportunities for society as a whole.

At the same time, waste management is a sector where impacts for health and the environment are of particular concern. The question if the advantages of recycling are outweighed by unwanted transfers and perpetuation of hazardous substances in the material cycle needs to be carefully considered and offers difficult challenges for regulators, authorities and economic actors.

Against this background, the *classification of waste as hazardous or non-hazardous, and, in particular, understanding at what point and under what circumstances waste is to be considered hazardous is a crucial decision in the entire chain of waste management from generation to final treatment* (indeed, it goes even beyond this, since the knowledge about what makes waste hazardous also is relevant in the case of waste prevention). At the point where a waste is correctly classified as hazardous, a number of important obligations are triggered, for instance on labelling and packaging, but also in terms of the available compliant treatment.

Oman is just now preparing the waste legislation for the future. In this work it is important to lean on all the experience developed world wide, but especially the Globally Harmonised System and the EU REACH-regulation (Regulation (EC) 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals) are relevant for the evaluation of waste streams and to establish which properties that render waste hazardous.

### 5.2. To whom is the guidance addressed?

This document aims at assisting national authorities and businesses with guidance on how to understand and correctly carry out the classification of waste.

## 6. Procedures for the classification of waste

### 6.1. General approach to the classification of waste

The assessment and classification of waste is applied to each distinct waste stream generated by a producer, if appropriate, following the obtainment of a representative sample. Where more than one waste type is present, each would need to be assessed separately. This ensures that any items or batches of hazardous waste

- are not erroneously classified as non-hazardous by mixing (diluting) it with other wastes
- are identified in time to prevent being mixed with other wastes, e.g. in a bin, bag, stockpile or skip.

Only mixed municipal waste from domestic households is exempt from these requirements.

The following chapter and flowchart guide through the general approach for classification of waste. The flowchart indicates if a

- the substance or object in question can be found on the absolute hazardous or non-hazardous waste list; or
- if a further classification based on the GHS is necessary.

## 6.2 Step 1: Is the Guidance Document applicable?

Before waste can be classified, it should be checked whether the substance or object in question is waste (as defined in the Oman legislation

The following shall be excluded from waste classification:

- gaseous effluents emitted into the atmosphere; (however gas in pressure bottles is waste)
- land (in situ) including unexcavated contaminated soil and buildings permanently connected with land;
- uncontaminated soil and other naturally occurring material excavated in the course of construction activities where it is certain that the material will be used for the purposes of construction in its natural state on the site from which it was excavated;
- radioactive waste;
- decommissioned explosives;
- faecal matter straw and other natural non-hazardous agricultural or forestry material used in farming, forestry or for the production of energy from such biomass through processes or methods which do not harm the environment or endanger human health.

The following shall be excluded from the scope of this Guidance Document to the extent that they are covered by other Omani legislation:

- Waste waters;
- animal by-products including processed products, except those which are destined for incineration, landfilling or use in a biogas or composting plant;
- Carcasses of animals that have died other than by being slaughtered, including animals killed to eradicate epizootic diseases, and that are disposed of in accordance with other Omani legislation (Comment – if there is no other Omani legislation it should maybe be developed);
- Without prejudice to obligations under other relevant Community legislation, sediments relocated inside surface waters for the purpose of managing waters and waterways or of preventing floods or mitigating the effects of floods and droughts or land reclamation shall be excluded from the scope of this Guidance Document if it is proved that the sediments are non-hazardous.
- Specific rules for particular instances, or supplementing those of this Guidance Document, on the management of particular categories of waste, may be laid down by means of individual legislation.

### 6.3 Step 2: Is sufficient knowledge available

Is sufficient knowledge on the composition of the waste available to determine if it displays hazardous properties either by calculating or testing in line with Step 4?

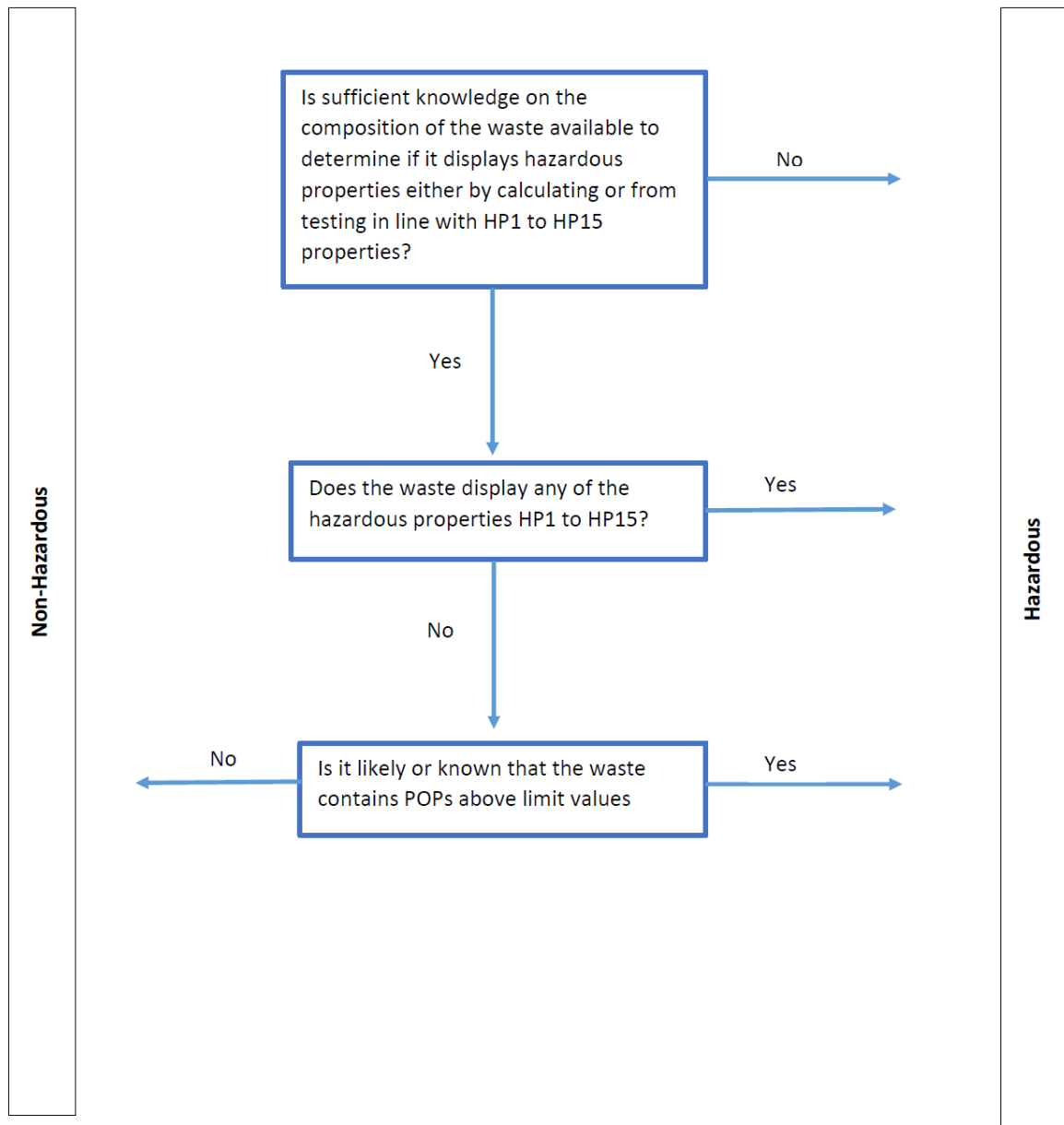


Figure 1: Availability of sufficient knowledge of hazardous properties of the waste.

Obtaining sufficient information about the *presence* and the *concentration* of each of the hazardous substances in the waste, in order to be able to determine if the waste might display any of the hazardous properties HP1 to HP15, is an important step in waste classification. Certain information on the composition of the waste is required, independent from the chosen method of assessing the hazardous properties (calculation or testing) as it is described in Step 4. There are several ways to gather information on the relevant composition of the waste, the hazardous substances present and potential hazardous properties displayed:

- information on the 'waste-generating' manufacturing process/chemistry and its input substances and intermediates including expert judgments (useful sources may be BREF reports, industrial process handbooks, process descriptions and lists of input materials provided by the producer, etc.);
- information from the original producer of the substance or object before it became waste, e.g. Safety Data Sheets (SDS) or GHS pictograms, product fiches (see in more detail Annex B);
- databases on waste analyses available;
- sampling and chemical analysis of the waste (see Chapter 10)

Once information has been established on the composition of the waste, it becomes possible to assess if the identified substances are classified as hazardous, i.e. if they are assigned a hazard statement code (see under step 3). In order to determine if the contained substances are classified as hazardous and to learn more about the specific hazard classes and categories the substances may be attributed according the CLP Regulation, please refer to the guidance given by chapter 3.4 of this document

#### 6.4 Step 3: Hazard Statement Codes

Whether substances identified as constituents of the relevant waste are considered hazardous substances, needs to be assessed in line with GHS criteria. For useful information tools in this context, consult chapter **Error! Reference source not found.** of this document.

Note that according to GHS Convention, 'hazard statements' are introduced defined as follows:

*'Hazard Statement' means a phrase assigned to a hazard class and category that describes the nature of the hazards of a hazardous substance or mixture, including, where appropriate, the degree of hazard;*

An example for a hazard statement code and assigned hazard class and category is:

##### Hazard statement:

|      | Description:     | Hazard class and category: |
|------|------------------|----------------------------|
| H330 | Fatal if inhaled | Acute Tox. 2               |

The first digit after the 'H' represents the categorization of the hazard (2 – physical hazards, 3 – health hazards, 4 – environmental hazards), the second and third digit are consecutive numbers clustering hazard codes.

Please note that if direct testing of hazardous properties (as it is typically conducted for the physical hazardous properties, (see Step 4) is considered, sampling and chemical analysis of the waste under consideration may not be necessary. Instead the other information sources as mentioned above may already indicate whether a targeted direct testing on certain hazardous properties may be reasonably performed.

If sampling and chemical analysis of the waste under consideration are considered in order to determine its chemical composition (e.g. in order to carry out the calculation approach in the assessment of hazardous properties as described in Step 4), please refer to chapter 10.

Finally, if the gathered information on the composition of the waste (taking into consideration all above displayed options) *does not allow to conclude* on or assess the hazardous properties displayed by the waste, neither by calculation nor by testing of the waste in line with the following step 4, *the waste is to be classified as hazardous*.

Please note that although direct testing methods are available for some hazardous properties as it is described in Step 4, they are not available for all hazardous properties. As a consequence, direct testing cannot be used to fully classify a waste of unknown composition as non-hazardous.

#### 6.5 Step 4: Does the waste display any of the hazardous properties HP1 to HP15?

According to The Globally Harmonized System of Classification and Labelling of Chemicals (GHS) / 10 / describes 15 properties (HP1 to HP15) of waste which render it hazardous. Table 5 provides an overview on the aforementioned hazardous properties.

Table 5: Properties of waste which render it hazardous

| Hazardous Properties |                                                                                                            |
|----------------------|------------------------------------------------------------------------------------------------------------|
| HP1                  | Explosive                                                                                                  |
| HP2                  | Oxidising                                                                                                  |
| HP3                  | Flammable                                                                                                  |
| HP4                  | Irritant – skin irritation and eye damage                                                                  |
| HP5                  | Specific Target Organ Toxicity (STOT)/<br>Aspiration Toxicity                                              |
| HP6                  | Acute Toxicity                                                                                             |
| HP7                  | Carcinogenic                                                                                               |
| HP8                  | Corrosive                                                                                                  |
| HP9                  | Infectious                                                                                                 |
| HP10                 | Toxic for reproduction                                                                                     |
| HP11                 | Mutagenic                                                                                                  |
| HP12                 | Release of an acute toxic gas                                                                              |
| HP13                 | Sensitising                                                                                                |
| HP14                 | Ecotoxic                                                                                                   |
| HP15                 | Waste capable of exhibiting a hazardous property listed above not directly displayed by the original waste |

As soon as step 4 is completed, sufficient information on the relevant composition of the waste under consideration should be available. This means sufficient knowledge of the hazardous substances contained in the waste and how they are classified (e.g. if they are attributed any relevant hazard statement codes according the CLP Regulation) should be available to the extent, that at least one of the following methods to determine if the waste displays hazardous properties, can be applied:

- **Calculation** if threshold limits based on hazard statement codes (individually depending on the properties HP4 to HP14, (See chapter 9 in Appendix 5) are equalled or exceeded by the substances that are present in the waste under consideration;
- **Testing** if the waste displays hazardous properties or not.

Chapter 9 provides a detailed description and guidelines on how to assess the individual hazardous properties HP1 to HP15 via **calculation** or **testing**.

Regarding the **calculation** method, it should be noted that hazardous substance content values in waste as they have been determined, e.g. by sampling and chemical analysis of the waste under consideration, have to be compared against the concentration limits listed in GHS /1/. These concentration limits refer to the state of the waste as it is when the classification of the waste is undertaken, i.e. the fresh weight of the waste.

However, many analytical methods specify results on a dry weight basis. As a consequence, analytical values expressed on the basis of dry matter have to be corrected for the moisture content of the waste in order to determine the concentration of the substance in the original waste, as it will be subsequently managed. Waste classifiers should be aware that the laboratories often express results based on dry weight and should therefore be attentive to ensure that they are aware on what basis the analytical results are provided.

*Classification of waste has to be carried out on the basis of wet weights* (either as originally tested or converted from the dry weight figures). Additionally, it should be noted explicitly that **Omani legislation** does not allow a dilution or mixing of the waste to lower the initial concentrations of hazardous substances.

Please further note that the concentration limits defined in GHS /1/ **do not apply to pure metal alloys in their massive form** as long as they are not contaminated with hazardous substances. Further information on the classification of metal alloys can be found in chapter 7.11.

Additional guidance regarding sampling and chemical analyses of waste in order to make use of the calculation method can be found in chapter 10.

**Direct testing** to determine whether a specific hazard property is displayed may be appropriate in some cases, for some hazard properties (e.g. the physical properties such as HP 1 'Explosive', HP 2 'Oxidising' and HP 3 'Flammable').

If a hazardous property has been assessed by a test and by calculating concentrations of hazardous substances as indicated in GHS /1/, the results of the test shall prevail. Finally, if the waste displays one or more of the 15 hazardous properties, the corresponding GHS classification has to be assigned. Whereas, if the waste displays no hazardous property, step 5 has to be undertaken to check whether the waste contains specific POPs above the respective limit values. This is the final step before the waste under consideration can be assigned as hazardous waste or non-hazardous waste.

#### 6.6 Step 5: Is it likely or known that the waste contains any of the POPs?

The last step in the classification of waste as hazardous or non-hazardous is to determine whether it's content of specific POPs. A detailed overview, including a list of POPs to be considered and the respective concentration limits, is provided in chapter 7.15.

In case the waste does not contain relevant POPs or its POP content is below the concentration limits, the waste is non-hazardous, otherwise the waste is hazardous.

## 7. Examples of the classification of complex entries

This chapter presents additional information and examples providing guidance on characterisation approaches to be followed for some of the more problematic and complex entries, in particular packaging waste, waste from electrical and electronic equipment (WEEE) and end of life vehicles (ELV).

### 7.1 Packaging waste and contents

In order to decide if packaging waste is hazardous or non-hazardous it is necessary to determine whether the packaging/container is *nominally* empty. It is suggested to understand 'nominally empty' in the sense that the product's contents were effectively removed. This removal can be achieved by draining or scraping. The circumstance that minimal residues of the contents are present in the packaging waste does not preclude the packaging waste to qualify as "nominally empty".

To decide upon the question whether packaging is *nominally* empty, practical approaches can be used. For example

1. If the container contain material, either its original contents or another type of contaminant then it is not packaging waste
2. "Completely emptying" means proper emptying ("free of trickles" such as leftover powder, sludge and drops; brush clean, spatula clean) except for unavoidable residues, without applying additional measures (such as heating). The term does not include cleaning of containers. A container has been emptied completely, if in the case of a renewed attempt of emptying, such as inverting the container no longer drops or solid remains are released.
3. When the packaging contains residual material that cannot be removed by normal standards (e.g. due to size of aperture or nature of material), then the waste should not be classified as packaging waste but as the residual material waste (e.g. half empty tin of solidified varnish might be classified as hazardous waste).
4. In the case that waste containers are washed to remove the contents, further considerations should be taken to ensure an environmentally sound method is used.
5. If the packaging is *nominally* empty, it should be checked if it is metallic packaging which contains a dangerous solid porous matrix (e.g. asbestos in old fireproof packaging material), including empty pressure containers. Such metallic packaging needs to be assigned as hazardous waste
6. It has to be noted that packaging which is *nominally* empty but which still can contain small quantities of residues can be either hazardous because (1) it displays hazardous properties because of the remaining residues OR because (2) it displays hazardous properties because of the packaging material itself (of which the packaging is manufactured) because it is contaminated with hazardous substances from the manufacturing process (e.g. with impregnating agents, stabilisers, flame retardants, plasticisers, pigments, ...) or the use phase.
7. Accordingly, whether the waste displays hazardous properties due to the remaining residues and whether the packaging material itself displays hazardous properties. Calculations whether threshold limits defined in GHS / 1/, based on hazard statement codes, are exceeded, should be based on the weight of the waste as it is when the classification of the waste is undertaken (i.e. a comparison would be made between the amount of contained hazardous substances against the total weight of the *nominally* empty packaging plus the leftover residue). If hazardous properties can be related to the residue or to the packaging material itself - it is hazardous waste. Otherwise it is non-hazardous waste.

## 7.2 Waste from electrical and electronic equipment (WEEE)

WEEE is hazardous waste and *among others* may consist of

1. Fluorescent tubes and other mercury-containing waste
2. Discarded equipment containing chlorofluorocarbons
3. Transformers and capacitors containing PCBs
4. Discarded equipment containing or contaminated by PCBs
5. Discarded equipment containing hazardous components
6. Hazardous components removed from discarded equipment
7. Batteries and accumulators

Please note that the threshold values based on hazard statement codes refer to the state of the waste as it is when the classification of the waste is undertaken (i.e. the state in which it is usually transferred and subsequently managed). For the case of WEEE this might imply that if whole appliances are to be classified, the weight of the appliance has to be considered as basis for the applied concentration limits of hazardous substance. If separated fractions have to be classified (e.g. after selective treatment) the weight of the separated fractions are to be considered as basis for the applied concentration limits.

## 7.3 Labelling and record keeping of WEEE and batteries

Please note that labelling and record keeping obligations stemming from GHS do not apply to separate fractions of hazardous waste produced by households until they are accepted for collection, disposal or recovery by an establishment or an undertaking which has obtained a permit or has been registered in accordance with the GHS. Since collection points established under the future WEEE or Batteries Legislation, are suggested not to be subject to the registration or permit requirements, the said obligations do not apply to these collection points but only once WEEE or waste batteries are accepted for collection, disposal or recovery at a waste treatment facility.

## 7.4 End-of-life vehicles (ELV)

End of Life Vehicles (ELV) shall be treated as hazardous waste when discarded until all the hazardous substances have been removed.

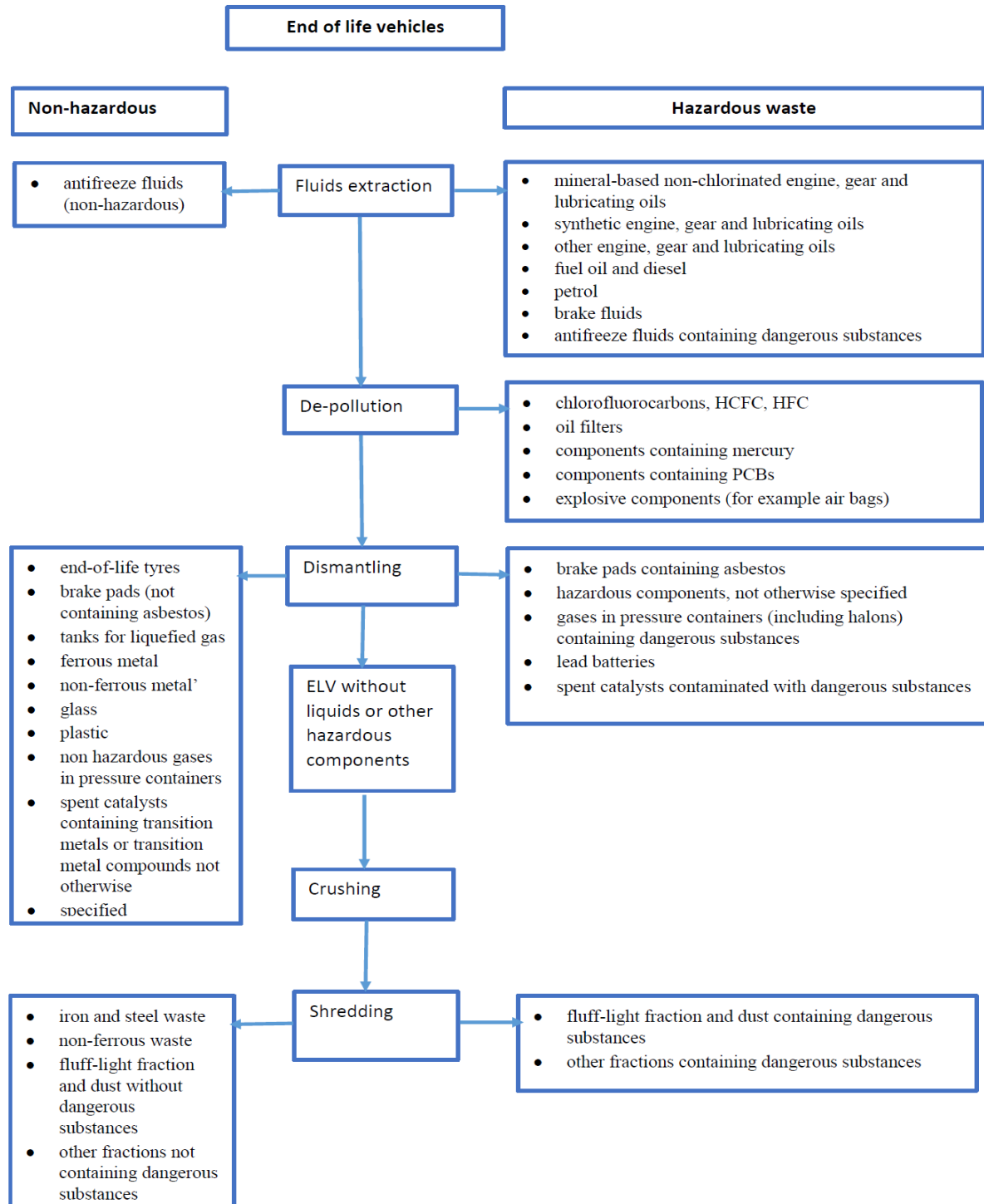


Figure 4: Hazardous and non-hazardous waste in End of Life Vehicles (ELV)

## 7.5 Examples for the assessment of specific constituents of specific waste types

The following chapter presents additional information and examples for the assessment of specific constituents of specific waste types. In the following, certain waste types or pollutants will be investigated and difficulties with classification encountered will be explained.

## 7.6 Organic constituents and specific chemical compounds

The following example provides general guidance on the classification of waste containing organic ingredients and specific chemical compounds such as PAH (Polycyclic Aromatic Hydrocarbons), BTEX (Benzene, Toluene, Ethylbenzene and Xylene) or other hydrocarbons.

### General information

Polycyclic aromatic hydrocarbons (PAH) describe substances (exemplary components: Acenaphthene, Anthracene, Flourene, Pyrene, etc.) that are often found together in groups of two or more /40 - US EPA 2008/.

BTEX (acronym for Benzene, Toluene, Ethylbenzene and Xylene) is a group of related volatile organic compounds. In some definitions found in literature it is only referred to BTX, where ethylbenzene is not included.

Hydrocarbons are compounds of hydrogen and carbon in various combinations that are present in petroleum products and natural gas. Some hydrocarbons are major air pollutants, some may be carcinogenic and others contribute to photochemical smog /25 - ETSA 2015/.

### Main origin of PAHs

PAHs are created when products like coal, oil, gas, and waste are burned but the combustion process is not complete. Examples are fumes from vehicle exhaust, coal production plants or other facilities burning coal, petroleum, oil or wood. Most PAHs are used to conduct research. However, some PAHs are used to make dyes, plastics, and pesticides. Some are used in medicines /40- US EPA 2008/.

BTEX are made up of naturally-occurring chemicals that are found mainly in petroleum products such as gasolines or naphtha. BTEX can enter the environment from leaking underground storage tanks, overfills of storage tanks, fuel spills from auto accidents and from landfills.

Benzene can be found in gasoline and in products such as synthetic rubber, plastics, nylon, insecticides, paints, dyes, resins-glues, furniture wax, detergents and cosmetics. Other sources are auto exhaust, industrial emissions and cigarette smoke. Toluene occurs naturally as a component of many petroleum products. Toluene is used as a solvent for paints, coatings, gums, oils and resins.

Xylenes are used in gasoline and as a solvent in printing, rubber and leather industries /12 - ATSDR 2014/.

Origins of waste containing hydrocarbons are industrial sites and combustion plants, motor vehicles and other gasoline-powered equipment, e.g. aircrafts or construction equipment /25 - ETSA 2015/.

### Aspects to be considered for waste classification

Table 6 contains hazard statement code(s), hazard class and category codes for benzene, toluene and xylene.

Table 6: Hazard Statement Code(s), Hazard Class and Category Code(s) for BTEX

| International Chemical Identification | CAS No.   | Hazard Statement Code(s)                                | Hazard Class and Category Code(s)                                                                |
|---------------------------------------|-----------|---------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| Benzene                               | 71-43-2   | H225<br>H350<br>H340<br>H372 **<br>H304<br>H319<br>H315 | Flam. Liq. 2<br>Carc. 1A<br>Mua. 1B<br>STOT RE 1<br>Asp. Tox. 1<br>Eye Irrit. 2<br>Skin Irrit. 2 |
| Toluene                               | 108-88-3  | H225<br>H361d ***<br>H304<br>H373 **<br>H315<br>H336    | Flam. Liq. 2<br>Repr. 2<br>Asp. Tox. 1<br>STOT RE 2 *<br>Skin Irrit. 2<br>STOT SE 3              |
| Ethylbenzene                          | 100-41-4  | H225<br>H304<br>H332<br>H373 (hearing organs)           | Flam. Liq. 2<br>Asp. Tox. 1<br>Acute Tox. 4 *<br>STOT RE 2                                       |
| <i>o</i> -xylene                      | 95-47-6   | H226                                                    | Flam. Liq. 3                                                                                     |
| <i>p</i> -xylene                      | 106-42-3  | H332                                                    | Acute Tox. 4 *                                                                                   |
| <i>m</i> -xylene                      | 108-38-3  | H312                                                    | Acute Tox. 4 *                                                                                   |
| Xylene                                | 1330-20-7 | H315                                                    | Skin Irrit. 2                                                                                    |

Regarding organic compounds, sum parameters like PAH, BTEX and hydrocarbons (the latter sometimes referred also as “mineral oils” or total petroleum hydrocarbons (TPH) are often applied in practical waste analysis. Benzo[*a*]pyrene can be used as a marker compound representing PAH for carcinogenicity for certain coal tar entries. For hazard statement code(s), hazard class and category code(s) of benzo[*a*]pyrene please refer to *Table 7*. More information on the usage of PAH and benzo[*a*]pyrene for the example of coal tar can be found in chapter 7.10.

Table 7: Hazard Statement Code(s), Hazard Class and Category Code(s) for benzo[a]pyrene

| International Chemical Identification | CAS No. | Hazard Statement Code(s) | Hazard Class and Category Code(s) |
|---------------------------------------|---------|--------------------------|-----------------------------------|
| Benzo[a]pyrene                        | 50-32-8 | H350                     | Carc. 1B                          |
| Benzo[def]chrysene                    |         | H340                     | Muta. 1B                          |
|                                       |         | H360FD                   | Repr. 1B                          |
|                                       |         | H317                     | Skin Sens. 1                      |
|                                       |         | H400                     | Aquatic Acute 1                   |
|                                       |         | H410                     | Aquatic Chronic 1                 |

## 7.7 Substances that deplete the ozone layer

The following section provides general guidance on the classification of waste containing substances that deplete the ozone layer (ODS).

### General information

Ozone-depleting substances generally contain chlorine, fluorine, bromine, carbon, and hydrogen in varying proportions and are often described by the general term halocarbons. Chlorofluorocarbons (CFCs), carbon tetrachloride, and methyl chloroform are important human-produced ozone-depleting gases. Another important group of human-produced halocarbons are the halons, which contain carbon, bromine, fluorine, and (in some cases) chlorine. Most known substances with a significant ozone depleting potential are covered by the Montreal Protocol which aims to phase out ODS.

These substances have a significant potential to harm the ozone layer for two reasons. The first is that they do not break down in the lower atmosphere - they can remain in the atmosphere for long time periods. The second is that they contain chlorine and/or bromine and thus help the natural reactions that destroy ozone /24 - EEA 2014/.

### Main origin of ODS

Ozone depleting substances were, and still are used in many applications including refrigeration, air conditioning, foam blowing, cleaning of electronics components, manufacture of solvents and as components of fire extinguishers.

Main sources for waste containing ODS which in practice can cause problems in their classification are foams from disposed refrigerators and construction and demolition wastes (e.g. waste containing PCB).

1. Chlorofluorocarbons, HCFC, HFC and other halogenated solvents
2. Discarded equipment containing chlorofluorocarbons, HCFC, HFC
3. Gases in pressure containers (including halons) containing hazardous substances
4. Old spray cans containing ODS

### Aspects to be considered for waste classification

Follow Omani guidelines for ODS. List of substances to be classified as ODS and their respective ozone-depleting potential is hazardous waste

As a provisional measure, the cut of value at a concentration limit of 0.1 % decides if the ODS is hazardous waste or not. The generic concentration limit for substances (in a preparation), classified as hazardous to the ozone layer (N, R59), that trigger classification of the mixture as hazardous to the ozone layer, lies at 0.1 %. This means that waste containing 0.1 % or more of ODS will have to be classified as hazardous by HP14. Thereby the concentration limit of 0.1 % is related to an individual ODS not to the total of such substances.

### 7.8 Asbestos

The following example provides general guidance on the classification of waste containing asbestos.

#### General information

Asbestos is a mineralogical name which describes certain fibrous silicates belonging to the mineralogical group of the serpentine and the amphibole minerals and those are crystallized in the so-called asbestiform form. The minerals that fall under this definition are: amosite, crocidolite, anthophyllite, chrysotile, fibre-shaped actinolite and tremolite [OVAM 2015].

#### Main origin of Asbestos

The use of asbestos including chrysotile is in practice completely banned in Oman. However, asbestos is still a substance of concern as there were numerous recorded uses of asbestos and it still can be found inter alia in insulation, as a constituent of cement, in industrial buildings, plants, private homes, ships, heating and cooling systems and work equipment [OSHA Unknown].

### Aspects to be considered for waste classification

For a decision the relevant hazardous property is HP 7 'Carcinogenic'. Asbestos is classified according to the hazard class 'Carc. 1A' and category code 'STOT RE 1' corresponding to hazard statement codes H350 and H372. Following the concentration limit for H350 is 0.1 %.

As a consequence, waste containing 0.1 % or more of asbestos will have to be classified as hazardous by HP7. Please note that the identification of asbestos waste usually is done on the basis of knowledge on the material and expert judgement. Materials containing asbestos, for example a sheet of insulation material, is classified under the appropriate code for that asbestos waste.

### 7.9 Wastes containing CaO and Ca(OH)<sub>2</sub>

The following example provides general guidance on the classification of waste containing calcium oxide CaO and calcium hydroxide Ca(OH)<sub>2</sub>.

#### General information

CaO (also called lime or quicklime) may take the form of odourless crystals, white or greyish- white lumps, or granular powder. The commercial material may have a yellowish or brownish tint because of its iron content. Ca(OH)<sub>2</sub> (also called hydrated lime) is a soft white, powder or granule and non-combustible.

#### Main origin of CaO and Ca(OH)<sub>2</sub>

Calcium oxide and calcium hydroxide are used in similar industries and applications:

- Use as raw material in the preparation of chlorinated lime, bleaching powder, and calcium salts. Also used as a binding agent for the manufacture of several products such as cement, and other building and paving materials.

- Used for water treatment and for the treatment of waste effluents from different industries.
- Used as a scrubbing and neutralizing agents in the chemical and petrochemical industry.
- Large volumes of calcium oxide and calcium hydroxide are generated in combustion processes and can be found in the leftover ash.
- Involved in different operations in the following industries: iron and steel manufacturing (as well as other metals), ammonia synthesis, metal ores refining, manufacture of fine chemicals (e.g. pharmaceuticals, lubricants), pulp and paper industry, leather manufacturing, etc.

When  $\text{CaO}/\text{Ca}(\text{OH})_2$  is used for scrubbing flue gas in thermal disposal of waste, the following entry may apply for the solid residues (also taking into account the potential presence of other hazardous substances in the flue gas).

#### Aspects to be considered for waste classification

The relevant hazardous properties are HP 4 'Irritant – skin irritation and eye damage' and HP 5 'Specific Target Organ Toxicity (STOT)/Aspiration Toxicity'. Corresponding concentration limits are laid down in

. In case these hazard statement codes can be validated by using additional information (e.g. information from the waste generating process), the consequence is:

If the sum of the concentrations of all substances classified as H318 (e.g.  $\text{CaO}$  and  $\text{Ca}(\text{OH})_2$ ) exceeds or equals 10 % - the waste shall be classified hazardous according HP4. •

Additionally:

if the sum of concentrations of all substances classified as H335 (e.g.  $\text{CaO}$  and  $\text{Ca}(\text{OH})_2$ ) exceeds or equals 20 % - the waste shall be classified hazardous according HP5. •

Table 8: Hazard statement codes and concentration limits for  $\text{CaO}$  and  $\text{Ca}(\text{OH})_2$

|                          | Hazard Class and Category Code(s) | Hazard Statement Code(s) from self-classification | Concentration limit (total of substances) |
|--------------------------|-----------------------------------|---------------------------------------------------|-------------------------------------------|
| $\text{CaO}$             | Eye Dam. 1                        | H318                                              | $\geq 10 \%$                              |
|                          | STOT SE 3                         | H335                                              | $\geq 20 \%$                              |
| $\text{Ca}(\text{OH})_2$ | Eye Dam. 1                        | H318                                              | $\geq 10 \%$                              |
|                          | STOT SE 3                         | H335                                              | $\geq 20 \%$                              |

#### 7.10 Wastes containing coal tar and bitumen

The following example provides general guidance on the classification of waste containing coal tar.

### General information

Coal tar is a viscous material composed of complex, high-molecular-weight, compounds e.g. derived from the destructive distillation of wood or coal /25 - ETSA 2015/.

Bitumen is a generic term applied to natural inflammable substances of variable colour, hardness, and volatility, composed principally of a mixture of hydrocarbons substantially free from oxygenated bodies /25 - ETSA 2015/. Bitumen is manufactured from the distillation of crude oil during petroleum refining /11 - Asphalte Institute & Eurobitume 2015/.

/11- Asphalte Institute & Eurobitume 2015/ further explain the terminology of bitumen: *"Petroleum bitumen is known by different names throughout the world. For example the term 'bitumen' is typically used in Europe and is synonymous with the term 'asphalt', or 'asphalt binder' used in North America. Outside North America, the term 'asphalt' is used to describe mixtures of bitumen with mineral materials. [...]"*

*Coal derived products such as coal tar or coal-tar pitches are very different from bitumen. These are manufactured by the high-temperature pyrolysis (>800°C) of bituminous coals and differ from bitumen substantially in composition, physical characteristics, and potential health risks."*

### Main origin of Coal Tar

The majority of coal tar is distilled to produce refined products, including creosote, coal-tar pitch, crude naphthalene, and anthracene oils. Some crude coal tar is used as fuel for blast furnaces in the steel industry, because of its high availability and heating value. In the industry of alumina and aluminium production and processing, coal tar is used in several process steps, particularly in the manufacturing of anodes. Further applications are in the broad sectors of construction and in various coal related industries.

According to /11 - Asphalte Institute & Eurobitume 2015/ the current world production of bitumen is approximately 87 million tons per year and more than 250 known applications of bitumen exist. The majority of bitumen is used in the construction sector, in particular in paving and roofing applications.

### Aspects to be considered for waste classification

Potential hazards of wastes containing coal tar depend on their level of PAHs, which are known to have carcinogenic effects (high for coal tar, rather low in bitumen) /19 - CUMBRIA 2011/. Thus, please refer also to 7.6 in this Appendix 5.

Indicator tests exist to identify whether the waste containing coal tar contains a significant concentration of PAH components. Tests will indicate presence of PAH but *not* give a measurement. Examples are /34, 19 - OVAM 2015, CUMBRIA 2011/:

- use of PAH marker in combination with use of a UV lamp;
- white spray paint;
- adding a drop of methylene chloride.

When the test gives positive results it is assumed that the material contains tar and therefore is dangerous. Unless the holder of the waste stream is able to demonstrate that the concentration of PAHs is below the thresholds levels in Annex III to the WFD (see Chapter 11 in this Appendix 5) and thus can be classified as non-hazardous. However the classification as non-hazardous must not be done exclusively by the presence of PAHs but from all the substances present in the waste stream. The spray test is only indicative /34 - OVAM 2015/.

Coal tar and its distillates (e.g. tar oils) potentially display carcinogenic properties. If the concentration of such materials is at or above **0.1 %** the waste would possess the hazardous property HP 7 carcinogenic (cf. chapter C.7).

Determining the coal tar content is usually not conducted in the testing of waste. Instead, benzo[a]pyrene is used as a marker compound for carcinogenicity for certain coal tar entries. Where the concentration of benzo[a]pyrene is at or above **50 ppm (mg/kg)** e.g. in the asphalt concrete alone (excluding other material) then the amount of coal tar should be considered to be sufficient for the material to be hazardous.

Any sampling of asphalt concrete would need to ensure that layers with different concentrations of benzo[a]pyrene are properly and representatively assessed /37 - UK EA 2015/.

### 7.11 Metals and alloys

The following example provides general guidance on the classification of waste containing metals and alloys.

#### General information

The term metals comprises a number of chemical elements in the periodic table that form a metallic bond with other metal atoms. In most cases they appear shiny, are malleable and hard and are able to conduct heat and electricity. Materials with similar physical properties, resulting from the mixture of several metals (i.e alloys) are also often commonly referred to as “metal”.

#### Main origin of metals and alloys

Metal wastes arise in various sectors such as WEEE, ELV, construction and demolition and several industrial uses.

#### Classification of pure heavy metals and alloys hereof

Pure metal alloys are specifically exempt of the classification as hazardous:

‘The concentration limits defined in Annex III to WFD (see chapter 11 in this Appendix 5) do not apply to pure metal alloys in their massive form (not contaminated with hazardous substances).

Those waste alloys that are considered as hazardous waste must be specifically enumerated by the Omani authorities.

As the legislation does not define ‘massive form’, a particle size (diameter) > 1 mm is used as a threshold to indicate the classification of metals as ‘massive form’ in contrast to powders/dust /16 - BMLFUW AT 2015/.

Additionally, special care should be taken in order to avoid misclassification of scrap metals as waste. Omani legislation must establish criteria determining when certain types of scrap metal (iron, copper, steel and aluminium scrap) cease to be waste. Operators may decide voluntarily whether to make use of this end-of waste status for metal scrap that fulfils the respective criteria. **If fulfilling the relevant criteria, metals/alloys may not be considered waste as defined according the Annex III to WFD (see chapter 11 in this Appendix 5), and the classification according this guidance document is not applicable.**

In the case of massive metals, hazardous entries are unlikely to be used, unless a substantial indication exists that metal fractions have been contaminated with non-metal hazardous substances during the treatment process in a way that the waste displays hazardous properties.

Only alloys in their massive form that are specifically listed as hazardous, or contaminated by non-metal hazardous substances, should be treated as hazardous. According to /37 - UK EA 2015/, the only ‘alloy’ specifically listed is amalgam waste from dental care. However other pure metals that are hazardous is As, Cd, Hg, Ni, Se and Zn (as powder).

### 7.12 Organic peroxides

The following example provides general guidance on the classification of waste containing organic peroxides.

#### General information

'Organic peroxides means liquid or solid organic substances which contain the bivalent -O-O- structure and may be considered derivatives of hydrogen peroxide, where one or both of the hydrogen atoms have been replaced by organic radicals. The term organic peroxide includes organic peroxide mixtures (formulations) containing at least one organic peroxide. Organic peroxides are thermally unstable substances or mixtures, which can undergo exothermic self-accelerating decomposition. In addition, they can have one or more of the following properties:

- be liable to explosive decomposition;
- burn rapidly;
- be sensitive to impact or friction;
- react dangerously with other substances'

#### Main origin of organic peroxides

The plastics and rubber industries are important users of organic peroxides. Organic peroxides and mixtures containing organic peroxides are used as e.g. accelerators, activators, catalysts, cross-linking agents, curing agents, hardeners, initiators and promoters. Other applications may be the use as bleaching agents (e.g. flour bleaching), as active pharmaceutical ingredients and as flame retardant synergists.

#### Aspects to be considered for waste classification

In the determination of HP1 'Explosive' (cf. chapter 9.1), concentration limit values for organic peroxides need to be considered. A waste containing organic peroxides classified with hazard statement class H240 or H241 needs to be assessed for HP1, unless the following statements hold true:

- No other hazardous substances assigned hazard statement codes are present, and
- One of the following two criteria is met:
  - the waste contains  $>1\%$  but  $\leq 7\%$  hydrogen peroxide, and the available oxygen content (Oi) of the organic peroxide(s) is  $\leq 0.5\%$ ;
  - The waste contains  $\leq 1\%$  hydrogen peroxide, and the available oxygen content (Oi) of the organic peroxide(s) is  $\leq 1\%$ .

The available oxygen content, Oi (%) for any given organic peroxides has to be calculated according to:

$$O_i (\%) = \sum (16x (n_i \times c_i / m_i))$$

where:

$n_i$  : number of peroxide groups per molecule of organic peroxide i.

$c_i$ : concentration (mass %) of organic peroxide I in the waste.

$m_i$ : gram molecular mass of organic peroxide i

'Σ' means that if a waste contains more than one organic peroxide the available oxygen from each is added together. This includes all organic peroxides, and is not restricted to those classified as H240 or H241.

In /37 - UK EA 2015/ an example of calculation for methyl ethyl peroxide is provided, which is presented in the following. A waste contains 2.9 % methyl ethyl peroxide ( $C_2H_5-O-O-CH_3$ ) and 3 % hydrogen peroxide. The concentration of hydrogen peroxide is  $> 1\%$  and  $\leq 7\%$  hydrogen peroxide (see criteria above). Methyl ethyl peroxide has a molecular mass of 76g (so 'mi' is 76) and one peroxide functional group present (so ni is 1). When applying these values in the formula ' $O_i (\%) = \Sigma (16 \times (n_i \times c_i / m_i))$ ' for a concentration ('ci') of 2.9% in the waste, methyl ethyl peroxide has an available oxygen content ( $O_i$ ) of 0.61% ( $16 \times 1 \times 2.9 / 76$ ). This is above the available oxygen threshold of 0.5 % for criteria (i), so HP1 must be assessed.

Organic peroxides have specifically to be considered in determining HP 3 'Flammable'. A waste containing self-reactive substances or organic peroxides classified as H240 or H241 may possess the hazardous property HP 3 Flammable as a result of the assessment of HP 1 Explosive classifying the waste as a whole as H242.

### 7.13 Rubber wastes

The following example provides general guidance on the classification of rubber wastes.

#### General information

Rubber wastes are mainly end of life products from the use of tyres and general rubber goods.

#### Main origin of rubber waste

The annual production in 2013 of tyres and general rubber goods amounted to ~4.67 million tonnes and ~2.57 million tonnes respectively. Rubber waste arises in relevant quantities from tyres and general rubber goods. In 2012 the quantity of end-of-life tyres amounted to 2,765 kt. There is no specific information available for general rubber goods /26 - ETRMA 2015/.

#### Aspects to be considered for waste classification

The majority of rubber waste is allocated non-hazardous waste. However unused rubber products with oils or solvents or for contaminated off-specification rubber batches which are contaminated e.g. with oils or solvents must be classified as hazardous waste.

### 7.14 Plastic wastes

The following example provides general guidance on the classification of plastic wastes.

#### General information

A plastic material is an organic solid, essentially composed by a mixture of a polymer or combination of polymers of high molecular mass with other substances such as additives, stabilisers, fillers, etc. A polymer is a chain of many repeating molecular units of monomers. The monomers of plastic are either natural or synthetic organic compounds. The term resin is sometimes used as synonym of a commercial polymer [EC JRC 2014].

#### Main origin of plastic wastes

Plastic wastes arise from end of life plastic products from industrial or household applications. The generation of post-consumer plastics waste is dominated by plastic packaging waste. Other relevant

sectors in particular are: building and construction, automotive, WEEE and agriculture /22 - EC JRC 2014/.

### Aspects to be considered for waste classification

Plastic materials usually contain not only plastic polymers but a variety of different additives in the plastic matrix to improve performance and use application or processing properties of the final product. Additives are a different group of special chemicals which are either incorporated into the plastic matrix prior or during processing or applied to the final products' surface after the processing /13 - Bart 2005/.

A specific plastic waste can be hazardous either because of the additives it contains or because the waste is contaminated with hazardous substances e.g. oils or solvents.

Typically relevant additives in plastic waste are for example stabilisers or pigments (e.g. cadmium, chromium, lead or tin compounds, BPA, nonylphenol compounds) flame retardants (SCCPs, MCCPs, PBDEs, HBCD, etc.), plasticisers (phthalates, SCCPs, MCCPs, etc.) and a variety of other possibly contained additives (for details see /15 - BiPRO 2015/).

### 7.15 POP wastes

The following example provides general guidance on the classification of waste containing POPs.

#### General information

Persistent Organic Pollutants (POPs) are organic chemical substances. They possess a particular combination of physical and chemical properties such that, once released into the environment, they persist for long periods of time, they become widely distributed throughout the environment, accumulate in the fatty tissue of living organisms including humans, and are toxic to both humans and wildlife.

#### Main origin

POPs are a group of different substances or substance groups with different origin. Many POPs are or were intentionally produced pesticides or industrial chemicals which have been used for manifold technical or agricultural applications. Other POPs are produced unintentionally as a by-product e.g. during manufacturing or incineration processes.

### Aspects to be considered for waste classification

The Stockholm Convention on POPs and the Protocol to the regional UNECE Convention on Long-Range Transboundary Air Pollution (CLRTAP) are international instruments, whose POP substance lists are amended continuously. Oman has signed the Stockholm convention. As soon as new substances/substance groups are classified in the Convention as POPs, they are subsequently included in the Omani POP Regulation.

Specific waste related provisions for POPs are established under the aforementioned POP Regulation. Following Article 7, wastes consisting of POPs, containing or contaminated with them above specific limit values (concentration limit referred to in Article 7(4)(a) – the so called 'low POP-content limit value'), must be disposed of or recovered, without undue delay and in accordance with the provisions laid down in the POP Regulation in such a way as to ensure that the POP content is destroyed or irreversibly transformed so that the remaining waste and releases do not exhibit the characteristics of POPs. Disposal or recovery operations that may lead to recovery, recycling, reclamation or re-use of the POPs are prohibited.

The following substances are thus hazardous waste: 'Wastes containing polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/PCDF), DDT (1,1,1-trichloro-2,2- bis (4-chlorophenyl)ethane), chlordane, hexachlorocyclohexanes (including lindane), dieldrin, endrin, heptachlor, hexachlorobenzene, chlordecone, aldrine, pentachlorobenzene, mirex, toxaphene hexabromobiphenyl and/or PCB exceeding the concentration limits indicated in the POP convention.

Thus, waste containing specific POPs in concentrations which exceed the limit values established in the POP Regulation (cf. Table 8) shall be classified as hazardous. For wastes containing other POPs, the concentration limit values resulting from Annex III to WFD (see chapter 11 in this Appendix 5).

Table 9: Limit values established in the POP Regulation for those POPs which are listed in the LoW

| Substance                                                       | CAS No.              | EC No.    | Concentration limit referred to in Article 7(4)(a) |
|-----------------------------------------------------------------|----------------------|-----------|----------------------------------------------------|
| Polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/PCDF) |                      |           | 15 µg/kg <sup>(1)</sup>                            |
| DDT (1,1,1-trichloro-2,2-bis (4-chlorophenyl)ethane)            | 50-29-3              | 200-024-3 | 50 mg/kg                                           |
| Chlordane                                                       | 57-74-9              | 200-349-0 | 50 mg/kg                                           |
| Hexachlorocyclohexanes, including lindane                       | 58-89-9              | 210-168-9 | 50 mg/kg                                           |
|                                                                 | 319-84-6             | 200-401-2 |                                                    |
|                                                                 | 319-85-7             | 206-270-8 |                                                    |
|                                                                 | 608-73-1             | 206-271-3 |                                                    |
| Dieldrin                                                        | 60-57-1              | 200-484-5 | 50 mg/kg                                           |
| Endrin                                                          | 72-20-8              | 200-775-7 | 50 mg/kg                                           |
| Heptachlor                                                      | 76-44-8              | 200-962-3 | 50 mg/kg                                           |
| Hexachlorobenzene                                               | 118-74-1             | 200-273-9 | 50 mg/kg                                           |
| Chlordecone                                                     | 143-50-0             | 205-601-3 | 50 mg/kg                                           |
| Aldrin                                                          | 309-00-2             | 206-215-8 | 50 mg/kg                                           |
| Pentachlorobenzene                                              | 608-93-5             | 210-172-5 | 50 mg/kg                                           |
| Polychlorinated Biphenyls (PCB)                                 | 1336-36-3 and others | 215-648-1 | 50 mg/kg <sup>(2)</sup>                            |
| Mirex                                                           | 2385-85-5            | 219-196-6 | 50 mg/kg                                           |
| Toxaphene                                                       | 8001-35-2            | 232-283-3 | 50 mg/kg                                           |
| Hexabromobiphenyl                                               | 36355-01-8           | 252-994-2 | 50 mg/kg                                           |

1) The limit is calculated as PCDD and PCDF according to the toxic equivalency factors (TEFs)

2) Where applicable, the calculation method laid down in European standards EN 12766-1 and EN 12766-2 shall be applied.

Waste which falls under the obligations of Article 7 of the POP Regulation because it contains POPs in concentrations which exceed the low POP content limit value is not necessarily a



hazardous waste For example a waste containing pentaBDE (main historic use in flexible PUR foams for automotive and upholstery applications) in a concentration of 5 % shall be treated according to Article 7 of the POP Regulation (concentration limit for the sum of POP-BDEs 0.1 %) but is not a hazardous waste (limit value for pentaBDE 10 %). Note that all obligations for producers or holders of waste stemming from POPs Regulation have to be fulfilled independently. Please note that for wastes which are only classified as hazardous due to their POP content it may be difficult to complete the consignment notes as usually the hazardous properties HP 1 to 15 have to be recorded and reported.

## 8. Special Advices

### 8.1 Self-classifications

Manufacturers, importers and downstream users of substances are obliged to perform a self-classification according to this guideline (and according to future Omani legislation).

There can be multiple classifications for the same substance due to:

- the different composition, form or physical state of the substance placed on the market;
- a manufacturer or producer identifying insufficient information to assess that hazard class or category (which they will report as 'data lacking', 'inconclusive', or 'conclusive but not sufficient for classification');
- the manufacturer, importer or downstream user has access to, or has generated, different or additional data.

Self-classifications may be used to identify what hazard classes and categories have already been identified by other notifiers going beyond the harmonised classification and should serve as general information basis. It is recommended to check in particular those self-classifications showing the highest number of notifiers. There are ongoing efforts to get notifiers to agree on self-classifications. However the waste holder cannot finalise the classification of the substances solely based on self-classifications. The classification shall be accepted by MECA and/or be'ah. It is recommended to use other information sources for the classification of the waste, such as SDS.

### 8.2 The C&L Inventory as research tool

The C&L Inventory <https://echa.europa.eu/information-on-chemicals/cl-inventory-database/45/> managed by the ECHA can be used to search for the classification of substances or group of substances which are relevant in the context of waste classification (and, if applicable, for verification of that information). This inventory allows for an easy research for harmonised classifications of substances or group of substances as it contains information from Table 3.1 and Table 3.2 of Part 3 of Annex VI to the CLP Regulation /1/. It also contains self-classifications provided in the framework of registration of substances under REACH and notifications of unregistered substances (e.g. low volume importers who are not obliged to register). When no harmonised classification and more than one self-classification is reported in the C&L Inventory, the ECHA database on registered substances can help supporting information obtained from the C&L Inventory (<http://echa.europa.eu/de/information-on-chemicals/registered-substances>) /46/.

Furthermore the C&L Inventory is translated into all EU languages.

However, it should be noted that the C&L Inventory is subject to regular changes in content and the content should be considered with caution (e.g. the convergence of classifications per substance is a steady work in progress in the C&L Inventory).

Please find below the exemplary harmonised entry of 'lead chromate' (CAS Number 7758-97-6) as it is displayed in the C&L Inventory.

## Harmonised classification - Annex VI of Regulation (EC) No 1272/2008 (CLP Regulation)

### General Information

| Index Number | EC Number | CAS Number | International Chemical Identification |
|--------------|-----------|------------|---------------------------------------|
| 082-004-00-2 | 231-846-0 | 7758-97-6  | lead chromate                         |

ATP Inserted / Updated: CLP00/ATP01  
CLP Classification (Table 3.1)

| Classification                    |                           | Labelling                 |                                        |                                 | Specific Concentration limits, M-Factors | Notes  |
|-----------------------------------|---------------------------|---------------------------|----------------------------------------|---------------------------------|------------------------------------------|--------|
| Hazard Class and Category Code(s) | Hazard Statement Code (s) | Hazard Statement Code (s) | Supplementary Hazard Statement Code(s) | Pictograms, Signal Word Code(s) |                                          |        |
| Carc. 1B                          | H350                      | H350                      |                                        | GHS09<br>GHS08<br>Dgr           |                                          | Note 1 |
| Repr. 1A                          | H360Df                    | H360Df                    |                                        |                                 |                                          |        |
| STOT RE 2                         | H373 **                   | H373 **                   |                                        |                                 |                                          |        |
| Aquatic Acute 1                   | H400                      |                           |                                        |                                 |                                          |        |
| Aquatic Chronic 1                 | H410                      | H410                      |                                        |                                 |                                          |        |

| Signal Words | Pictograms                                                                          |                                                                                       |
|--------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Danger       |  |  |
|              | Environment                                                                         | Health hazard                                                                         |

Figure 2: Exemplary harmonised entry for 'lead chromate' as displayed in the C&L Inventory

As displayed in Figure 2, 'lead chromate' is classified as:

- Carc. 1B H350
- Repr. 1A H360Df
- STOT RE 2 H373\*\*
- Aquatic Acute 1 H400
- Aquatic Chronic 1 H410

In order to assess if the waste in question displays hazardous properties (see Annex C) due to its content of the hazardous substance 'lead chromate', the information on hazard class, hazard category and hazard statement codes of 'lead chromate' needs to be considered.

### 8.3 Waste management of substances/ mixtures becoming waste

To classify substances and mixtures containing hazardous substances above certain thresholds, a SDS need to be provided by the supplier. SDS have to fulfil certain requirements and comply with a format defined in Article 31 of the REACH Regulation, and must include information:

- on the classification of the substance or mixture
- on the composition / the ingredients
- on 'disposal considerations'
- on exposure scenarios

With this information available, the SDS can be a useful information tool for the further assessment steps that have to be carried out during classification once a particular product has become waste. Note that in case the product becoming waste is a mixture of two or more substances (e.g. a pot of varnish), the classification information for mixtures is a valuable source of information in general and secondly the classifications of the individual component substances must be used, rather than the overall chemical classification of the mixture.

Section 3 of a SDS for mixtures provides the classifications for the individual hazardous constituents of the mixture. This information may be validated or complemented by means of a search at the C&L inventory /45/.

Note that for substances and mixtures for which a SDS is not mandatory as well as also in the case of articles, voluntary product information sheets may be available that are not conforming to SDS but provide information on composition and recommended disposal practices.

Additional checks are recommended where either:

- the information provided may be out of date (a product is discarded considerable time after it was last supplied);
- there is any reason to believe the information is incomplete, inadequate, or inaccurate.
- information on the waste-generating process suggests that additional substances (e.g. contaminants) may be present in the waste which are not covered by SDS.

### 8.4 Other information sources

Apart from the information sources presented in the previous chapters, there may exist further useful literature on the presence and content of substances potentially present in waste. Which source can be consulted must be decided on a case-by-case basis. In general, potential examples are:

- BREF documents;
- Industrial process handbooks;
- Sector notebooks of the US Environmental Protection Agency;
- Process and substance information from the producer of the waste (process descriptions);
- Databases on typical composition of certain wastes.



Especially regarding the later aspects it should be noted that in some States in the EU, databases specifically referring to composition, physical-chemical properties and classification of waste streams are publicly available. These databases further provide waste-specific guidance for producers or holders of waste and/or competent authorities. An example of such a relevant data base is ABANDA /48/ managed by German regional authority LANUV. In addition there is software available to facilitate waste classification, such as HazWasteOnline /47/ from the UK.

## 9. Specific approaches to determine hazard properties (HP1 to HP15)

*Please note that the flow charts for the assessment of hazardous properties as displayed in Annex C do not specifically recall that the concentration limits defined in Annex III to the WFD do not apply to **pure metal alloys** in their massive form.*

### 9.1 Determining HP 1: Explosive

#### Definition and further description (GHS /1/.)

The GHS /1/ defines HP 1 'Explosive' as:

"Waste which is capable by chemical reaction of producing gas at such a temperature and pressure and at such a speed as to cause damage to the surroundings. Pyrotechnic waste, explosive organic peroxide waste and explosive self-reactive waste is included."

Regarding HP 1, to note that the scope of GHS /1/ excludes "decommissioned waste explosives". Thus, it is recommended to check whether the relevant waste in question is hazardous waste in the first place.

The GHS /1/ further explains that:

'When a waste contains one or more substances classified by one of the hazard class and category codes and hazard statement codes shown in the waste shall be assessed for HP 1, where appropriate and proportionate, according to test methods. If the presence of a substance, a mixture or an article indicates that the waste is explosive, it shall be classified as hazardous by HP 1.'

Waste containing substances that are classified with the hazard class, category and statement codes in

**Table 10** can be tested to show whether it displays that hazardous property or not. Alternatively, a waste containing those substances can simply be assumed to be hazardous by HP 1.

Table 10: Hazard Class, Category Code(s) and Hazard Statement Code(s) for waste constituents for the classification of wastes as hazardous by HP 1 Explosive

| Hazard Class and Category Code(s) | Hazard statement Code(s) | Description                                        |
|-----------------------------------|--------------------------|----------------------------------------------------|
| Unst. Expl.                       | H 200                    | <i>Unstable explosives</i>                         |
| Expl. 1.1                         | H 201                    | <i>Explosive; mass explosion hazard.</i>           |
| Expl. 1.2                         | H 202                    | <i>Explosive, severe projection hazard</i>         |
| Expl. 1.3                         | H 203                    | <i>Explosive; fire, blast or projection hazard</i> |
| Expl. 1.4                         | H 204                    | <i>Fire or projection hazard</i>                   |
| Self-react. A                     | H 240                    | <i>Heating may cause an explosion</i>              |
| Org. Perox. A                     |                          |                                                    |
| Self-react. B                     | H 241                    | <i>Heating may cause a fire or explosion</i>       |
| Org. Perox. B                     |                          |                                                    |

Where a product that has become waste is known to be explosive, it shall also be considered as HP 1.

Some substances may be explosive under certain conditions, e.g. those assigned Hazard statement Codes H205 *May mass explode in fire* or EUH001 *Explosive when dry*. These substances do not make a waste hazardous by HP 1, but their presence in a waste could make that waste exhibit hazardous property HP 15; see chapter 9.15 for further details.

A waste containing a substance classified as H240 or H241 should be considered for HP 3 flammable where the waste is not hazardous by HP 1.

#### Flow Chart

Figure 3 sets out the assessment process for HP 1. (NB! read table 18 instead of table 9)

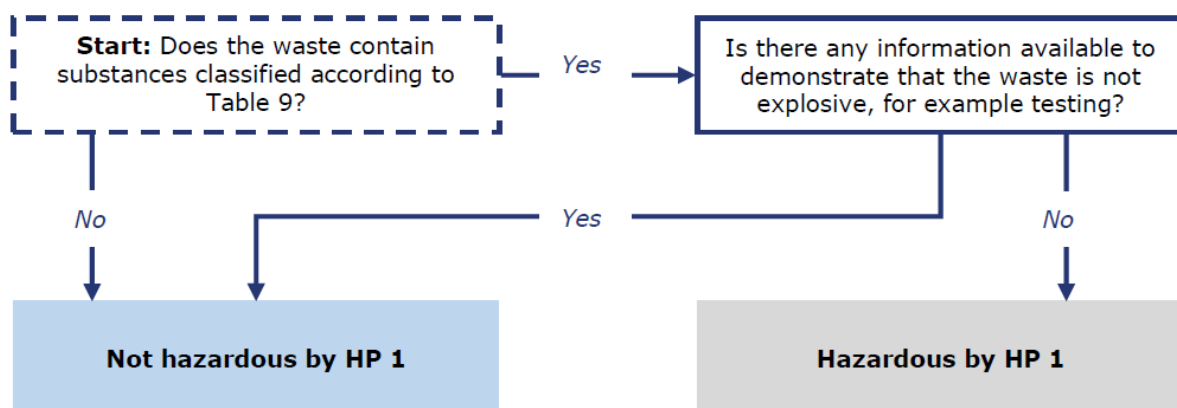


Figure 3: Flow chart for determination of HP 1 (Adjusted from [UK EA 2015])

### Test Methods

Part A of the Annex to the EC Test Methods Regulation /44/ provides the following test method which may be regarded in the assessment of HP 1 'Explosive':

#### A.14. Explosive Properties

Wastes containing substances listed in should be tested for explosive properties in accordance with /35 - ECHA 2013/.

Separate sections are provided in /35 - ECHA 2013/ for testing of mixtures containing:

- organic peroxides (2.15)
- self-reactive substances and mixtures (2.8)
- explosives (2.1)

The CLP Regulation classifies self-reactive substances and mixtures in one of the seven categories of 'types A to G' /23 - ECHA 2013/. Waste containing an organic peroxide or a self-reacting substance, where the waste is classified by testing as Type A (H240) or Type B (H241), displays HP 1. Where this is not the case, a waste classified as Type C, D, E or F (H242) displays HP 3.

A waste containing another substance listed in Table 9, where the waste is classified by testing as Unstable Explosive (H200), Division 1.1(H201), 1.2(H202), 1.3(H203) or 1.4(H204), displays HP 1.

A detailed example for an assessment of organic peroxides according HP 1 can be found in chapter 7.12

## 9.2 Determining HP 2: Oxidising

### Definition and further description of Annex III to WFD

Annex III to the WFD (see chapter 11 in this Appendix 5) defines HP 2 'Oxidizing' as:

*'waste which may, generally by providing oxygen, cause or contribute to the combustion of other materials'*

The WFD further explains that:

'When a waste contains one or more substances classified by one of the hazard class and category codes and hazard statement codes shown in Table 11 , the waste shall be assessed for HP 2, where appropriate and proportionate, according to test methods. If the presence of a substance indicates that the waste is oxidising, it shall be classified as hazardous by HP 2.'

A waste containing substances that are classified with the hazard class, category and statement codes in Table 11 can be tested to show whether it displays that hazardous property or not. Alternatively a waste containing those substances can simply be assumed to be hazardous by HP 2.

Table 11: Hazard Class, Category Code(s) and Hazard Statement Code(s) for waste constituents for the classification of wastes as hazardous by HP 2 Oxidising

| Hazard Class and Category Code(s) | Hazard statement Code(s) | Description                                         |
|-----------------------------------|--------------------------|-----------------------------------------------------|
| Ox. Gas 1                         | H 270                    | <i>May cause or intensify fire; oxidiser</i>        |
| Ox. Liq. 1                        | H 271                    | <i>May cause fire or explosion; strong oxidiser</i> |
| Ox. Sol. 1                        |                          |                                                     |
| Ox. Liq. 2                        | H 272                    | <i>May intensify fire; oxidiser</i>                 |
| Ox. Liq. 3                        |                          |                                                     |
| Ox. Sol. 2                        |                          |                                                     |
| Ox. Sol. 3                        |                          |                                                     |

Where

- the waste contains only one of these substances;
- that substance is assigned a specific concentration limit in Table 3.1 of Part 3 of Annex VI to CLP;
- that substance is present in the waste below that limit;

it can be assumed that the waste is not hazardous by HP 2.

An example is 'nitric acid' which is listed as H272, Ox. Liq. 3 with a specific concentration limit of  $\geq 65\%$ . Where 'nitric acid' is present in a waste above 65% that waste has to be classified as HP 2 (in addition to HP 8).

### Calculation method for oxidising gases

Where a waste contains a substance assigned H270 it is possible to calculate whether or not the waste displays HP 2. The calculation method is provided by ISO 10156 (as amended) and should be applied in accordance with section 2.4 of /23 - ECHA 2013/.

### Flow chart

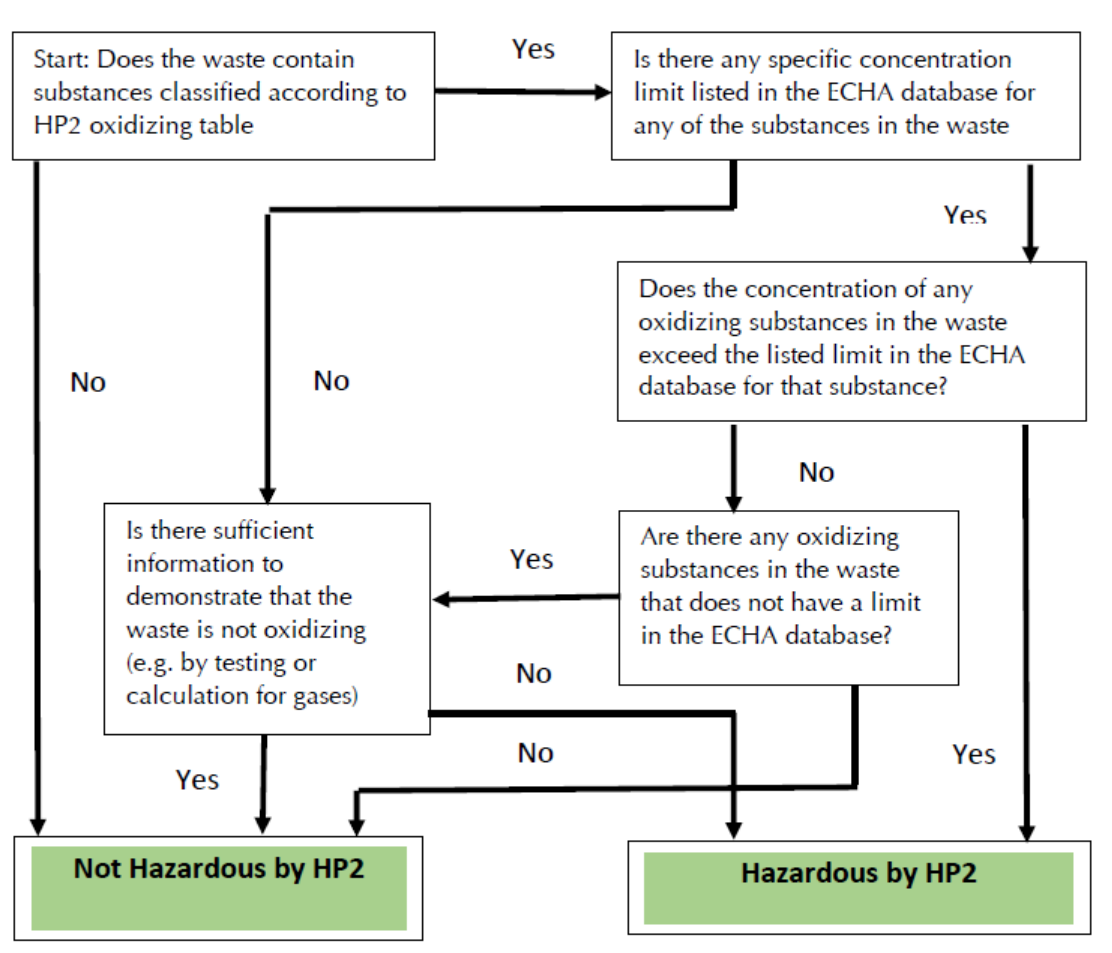


Figure 4: Flow chart for determination of HP 2 (Adjusted from /37 - UK EA 2015/)

### Test Methods

Part A of the Annex to the Test Methods Regulation /44/ provides the following test methods which may be regarded in the assessment of HP 2 'Oxidising':

A.17. Oxidising Properties (Solids)

A.21. Oxidising Properties (Liquids)

Wastes containing substances listed in Table 10 should be tested on oxidising properties in accordance with /23 - ECHA 2013/. Separate sections are provided in /23 - ECHA 2013/ for testing of mixtures containing:

- Oxidising gases (2.4)

- Oxidising liquids (2.13)
- Oxidising solids (2.14)

A waste containing an oxidising substance, where the waste is classified by testing as H270, H271, or H272, displays HP 2.

### 9.3 Determining HP 3: Flammable

#### Definition and further description of Annex III to WFD

Annex III to WFD (see chapter 11 in this Appendix 5) defines HP 3 'Flammable' over 6 indents:

- 'flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point  $> 55^{\circ}\text{C}$  and  $\leq 75^{\circ}\text{C}$ ;
- flammable pyrophoric liquid and solid waste: solid or liquid waste which, even in small quantities, is liable to ignite within five minutes after coming into contact with air;
- flammable solid waste: solid waste which is readily combustible or may cause or contribute to fire through friction;
- flammable gaseous waste: gaseous waste which is flammable in air at 20°C and a standard pressure of 101.3 kPa;
- water reactive waste: waste which, in contact with water, emits flammable gases in dangerous quantities;
- other flammable waste: flammable aerosols, flammable self-heating waste, flammable organic peroxides and flammable self-reactive waste.'

The WFD further explains that:

*'When a waste contains one or more substances classified by one of the following hazard class and category codes and hazard statement codes shown in the waste shall be assessed, where appropriate and proportionate, according to test methods. If the presence of a substance indicates that the waste is flammable, it shall be classified as hazardous by HP 3'*

A waste containing substances that are classified with the hazard class, category and statement codes in can be tested to show whether it displays that hazardous property or not. Alternatively a waste containing those substances, other than in trace amounts, can simply be assumed to be hazardous by HP 3.

Table 12: Hazard Class, Category Code(s) and Hazard Statement Code(s) for waste constituents for the classification of wastes as hazardous by HP3 Flammable

| Hazard Class and Category Code(s)                                    | Hazard statement Code(s) | Description                                                                   |
|----------------------------------------------------------------------|--------------------------|-------------------------------------------------------------------------------|
| Flam. Gas 1                                                          | H220                     | Extremely flammable gas                                                       |
| Flam. Gas 2                                                          | H221                     | Flammable gas                                                                 |
| Aerosol 1                                                            | H222                     | Extremely flammable aerosol                                                   |
| Aerosol 2                                                            | H223                     | Flammable aerosol                                                             |
| Flam. Liq. 1                                                         | H224                     | Extremely flammable liquid and vapour                                         |
| Flam. Liq. 2                                                         | H225                     | Highly flammable liquid and vapour                                            |
| Flam. Liq. 3                                                         | H226                     | Flammable liquid and vapour                                                   |
| Flam. Sol. 1<br>Flam. Sol. 2                                         | H228                     | Flammable solid                                                               |
| Self-react. CD<br>Self-react. EF<br>Org. Perox. CD<br>Org. Perox. EF | H242                     | Heating may cause a fire                                                      |
| Pyr. Liq. 1<br>Pyr. Sol. 1                                           | H250                     | Catches fire spontaneously if exposed to air                                  |
| Self-heat. 1                                                         | H251                     | Self-heating: may catch fire                                                  |
| Self-heat. 2                                                         | H252                     | Self-heating in large quantities; may catch fire                              |
| Water-react. 1                                                       | H260                     | In contact with water releases flammable gases which may ignite spontaneously |
| Water-react. 2<br>Water-react. 3                                     | H261                     | In contact with water releases flammable gases                                |



Where a waste contains substances assigned H220 or H221 it is possible to calculate whether or not the waste displays HP 3 (fourth indent). The calculation method is provided by ISO 10156 and should be applied in accordance with section 2.2 of /35 - ECHA 2013/.

Where a waste contains substance assigned H260 or H261, i.e. a substance which is capable of releasing a highly flammable gas at a rate in excess of 1 litre of gas per kilogram of substance per hour when water is added, it is possible to calculate the minimum concentration of the substance in the waste that would make it hazardous by HP 3 (fifth indent). Below this concentration the waste is not considered hazardous pursuant to HP 3 (fifth indent). At or above the concentration the waste is considered to be HP 3, or tested. Examples of substances and calculation is provided by /36 - UK EA 2015/ and is displayed in the following section.

A brief example for an assessment of organic peroxides according HP 3 based on assessing HP1 can be found in chapter 7.12.

Flow chart (NB! Table 11 is now Table 20)

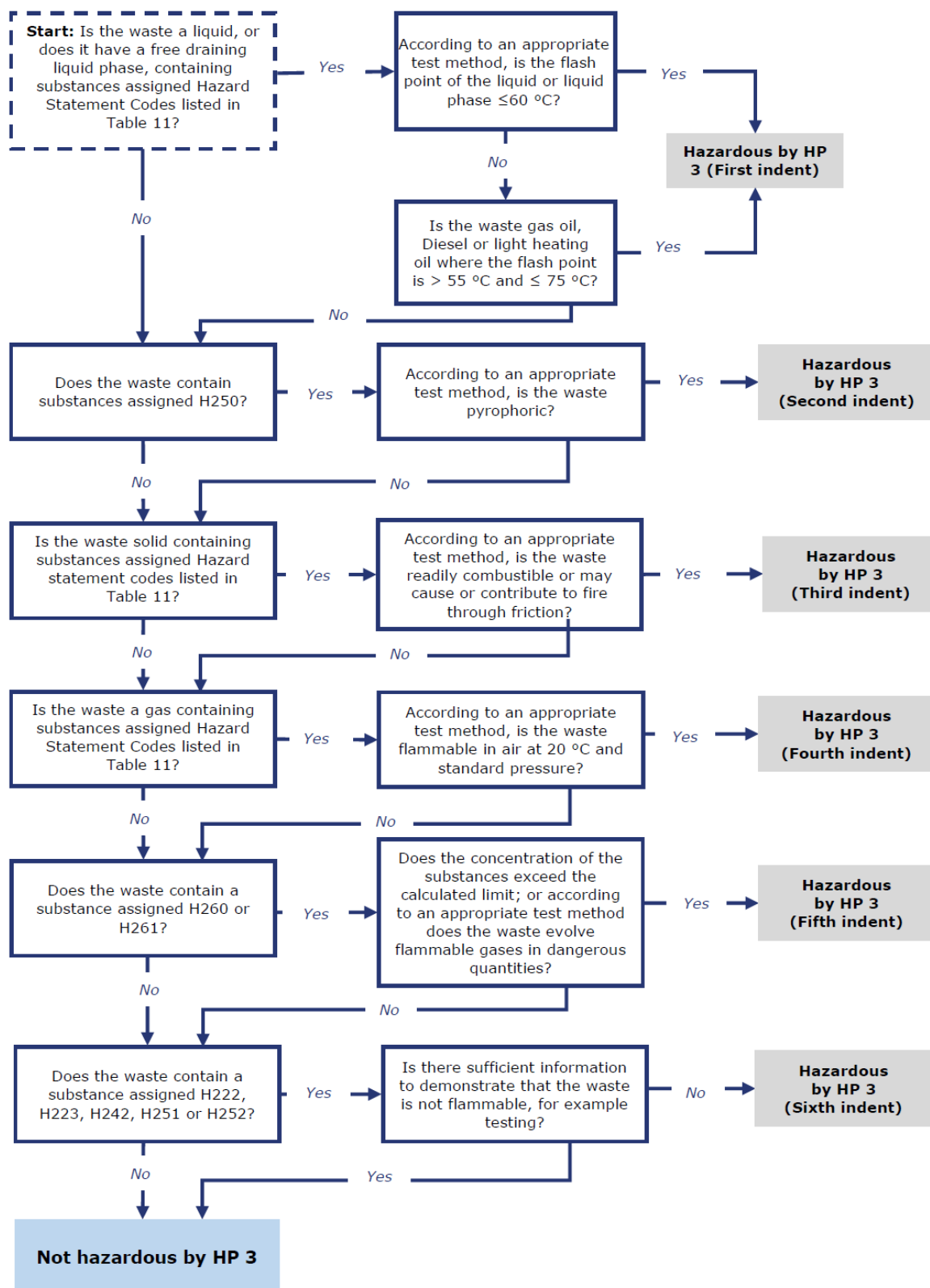


Figure 5: Flow chart for determination of HP 3 (Adjusted from /37 - UK EA 2015/)

### Calculation method for HP 3 (fifth indent)

As already indicated, when a substance is assigned H260 or H261 if it is capable of releasing a highly flammable gas at a rate in excess of 1 litre of gas per kilogram of substance per hour when water is added.

If a waste contains a substance assigned H260 or H261, it is possible to calculate the limiting concentration of the substance in the waste that would make it hazardous by HP 3 (fifth indent). The background of this calculation method is, that the amount of the reactive substance needed to generate one litre of the flammable gas is calculated, based on stoichiometry and by applying the volume of a mol of gas at standard pressure and temperature. The concentration limit of one litre is taken from test method A.12. Flammability (Contact with water) as described in Part A of the Annex to the Test Method Regulation/44/.

Below this concentration the waste will not be hazardous as a result of HP 3 (fifth indent). At or above the concentration the waste should be assumed to be HP 3, or tested. An example of how to do the calculation is taken from /37 - UK EA 2015/ and displayed below in Box 1.

Calculation method HP 3 (fifth indent)

1. Write a balanced equation for the reaction that produces the gas. The general form of this equation should be as follows:

$$rR + wW \rightarrow pP + gG$$

where R is the H260/H261 substance, W is water, P is a product of the reaction, and G is the gas released; r, w, p and g are the stoichiometric ratios that balance the equation.

2. Attribute molecular weights and stoichiometric ratios to the substances in the equation.

3. Divide (r x molar weight of R) by (g x 22.4). This gives the mass of R that will evolve 1 litre of gas. 1 mol of gas occupies 22.4 litres at standard temperature and pressure.

4. Divide this amount (in grams) by 1,000 (to convert to kilograms) and multiply it by 100 to give a percentage by weight, and thus the limiting concentration for HP 3 (fifth indent) of substance R.

Example calculation: A waste contains aluminium carbide. Aluminium carbide is a H260 substance which reacts with water to give methane gas.

|                   |   |         |               |                 |   |         |
|-------------------|---|---------|---------------|-----------------|---|---------|
| $Al_4C_3$         | + | $6H_2O$ | $\rightarrow$ | $2Al_2O_3$      | + | $3CH_4$ |
| aluminium carbide |   | water   |               | aluminium oxide |   | methane |
| 144 g             |   | 18 g    |               | 102 g           |   | 16 g    |
| 1 mol             |   | 6 mol   |               | 2 mol           |   | 3 mol   |

$r = 1$  mol of  $Al_4C_3$ ,  $R = 144$  g;  $g = 3$  mol  $CH_4$ .

Limiting concentration of aluminium carbide in waste =  $[144 / (3 \times 22.4)] / 1,000 \times 100$ ,  
which is 0.21% (approximately 0.2%).

Box 1: Calculation method HP 3 (fifth indent) /37 – UK EA 2015/

Threshold limits derived from the calculation for some H260 and H261 substances are given in **Error!**  
**Reference source not found..**

Table 13: Examples of substances which may cause a waste to exhibit HP 3 Flammable (fifth indent) and their threshold concentrations\* /37 - UK EA 2015

| Substance name                                                 | Hazard Statement Codes associated with HP3 (fifth indent) | Equation                                                                                         | Concentration limit for waste to be H3-A (fifth indent) (%) <sup>1</sup> |
|----------------------------------------------------------------|-----------------------------------------------------------|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| Lithium                                                        | H260                                                      | $2\text{Li} + 2\text{H}_2\text{O} \rightarrow 2\text{LiOH} + \text{H}_2$                         | 0.1                                                                      |
| Sodium                                                         | H260                                                      | $2\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2$                         | 0.2                                                                      |
| Magnesium powder (pyrophoric)                                  | H261                                                      | $\text{Mg} + 2\text{H}_2\text{O} \rightarrow \text{Mg}(\text{OH})_2 + \text{H}_2$                | 0.1                                                                      |
| Aluminium powder (pyrophoric)<br>Aluminium powder (stabilised) | H261                                                      | $2\text{Al} + 6\text{H}_2\text{O} \rightarrow 2\text{Al}(\text{OH})_3 + 3\text{H}_2$             | 0.1                                                                      |
| Potassium                                                      | H260                                                      | $2\text{K} + 2\text{H}_2\text{O} \rightarrow 2\text{KOH} + \text{H}_2$                           | 0.4                                                                      |
| Calcium                                                        | H261                                                      | $\text{Ca} + 2\text{H}_2\text{O} \rightarrow \text{Ca}(\text{OH})_2 + \text{H}_2$                | 0.2                                                                      |
| Zinc powder / zinc dust (pyrophoric)                           | H260                                                      | $\text{Zn} + 2\text{H}_2\text{O} \rightarrow \text{Zn}(\text{OH})_2 + \text{H}_2$                | 0.3                                                                      |
| Zirconium powder (pyrophoric)                                  | H260                                                      | $\text{Zr} + 4\text{H}_2\text{O} \rightarrow \text{Zr}(\text{OH})_4 + 2\text{H}_2$               | 0.2                                                                      |
| Aluminium carbide                                              | H260                                                      | $\text{Al}_4\text{C}_3 + 6\text{H}_2\text{O} \rightarrow 2\text{Al}_2\text{O}_3 + 3\text{CH}_4$  | 0.2                                                                      |
| Lithium aluminium hydride                                      | H260                                                      | $\text{LiAlH}_4 + \text{H}_2\text{O} \rightarrow \text{LiAl}(\text{OH})_2 + 4\text{H}_2$         | 0.1                                                                      |
| Sodium hydride                                                 | H260                                                      | $\text{NaH} + \text{H}_2\text{O} \rightarrow \text{NaOH} + \text{H}_2$                           | 0.1                                                                      |
| Calcium hydride                                                | H260                                                      | $\text{CaH}_2 + 2\text{H}_2\text{O} \rightarrow \text{Ca}(\text{OH})_2 + 2\text{H}_2$            | 0.1                                                                      |
| Calcium carbide                                                | H260                                                      | $\text{CaC}_2 + \text{H}_2\text{O} \rightarrow \text{Ca}(\text{OH})_2 + \text{C}_2\text{H}_2$    | 0.3                                                                      |
| Calcium phosphide                                              | H260                                                      | $\text{Ca}_3\text{P}_2 + 6\text{H}_2\text{O} \rightarrow 2\text{PH}_3 + 3\text{Ca}(\text{OH})_2$ | 0.4                                                                      |
| Aluminium phosphide                                            | H260                                                      | $\text{AlP} + 3\text{H}_2\text{O} \rightarrow \text{PH}_3 + \text{Al}(\text{OH})_3$              | 0.3                                                                      |
| Magnesium phosphide                                            | H260                                                      | $\text{Mg}_3\text{P}_2 + 6\text{H}_2\text{O} \rightarrow 2\text{PH}_3 + 3\text{Mg}(\text{OH})_2$ | 0.3                                                                      |

\* This is not a complete list of such substances.

1) Rounded to one decimal place.

### Test Methods

Part A of the Annex to the Test Methods Regulation provides the following test methods which may be regarded in the assessment of HP 3 'Flammable':

- A.10. Flammability (Solids)
- A.11. Flammability (Gases)
- A.12. Flammability (Contact with water)

Wastes containing substances listed in Table 11 should be tested for flammable properties in accordance with /23 - ECHA 2013/. Separate sections are provided in /23 - ECHA 2013/ for testing of mixtures containing:

- flammable gases (2.2)
- aerosols (2.3)
- flammable liquids (2.6)
- flammable solids (2.7)
- self-reactive substances and mixtures (2.8)
- pyrophoric liquids (2.9)
- pyrophoric solids (2.10)
- self-heating substances and mixtures (2.11)
- water reactive substances (2.12)
- organic peroxides (2.15)

### 9.4 Determining HP 4: Irritant – skin irritation and eye damage

#### Definition and further description of Annex III to WFD

Annex III to WFD (see chapter 11 in this Appendix 5) defines HP 4 'Irritant' as:

*'waste which on application can cause skin irritation or damage to the eye'*

HP 4 is linked to HP 8 'Corrosive', since both HPs refer to the potential for harm or damage to tissue at different levels of severity. Regarding HP 8, consult chapter 8 for further details.

Note that:

- Hazardous waste containing irritant substances can display irritant properties (depending on concentration);
- Hazardous wastes containing corrosive substances can display either corrosive or irritant properties dependent upon concentration.

Mechanical irritation produced by some substances is not included within the definition of HP 4.

The WFD further explains that:

*When a waste contains one or more substances in concentrations above the cut-off value, that are classified by one of the following hazard class and category codes and hazard statement codes and one or more of the following concentration limits is exceeded or equalled, the waste shall be classified as hazardous by HP 4.*

The cut-off value for consideration in an assessment for Skin corr. 1A (H314), Skin irrit. 2 (H315), Eye dam. 1 (H318) and Eye irrit. 2 (H319) is 1 %.

If the sum of the concentrations of all substances classified as Skin corr. 1A (H314) exceeds or equals 1 %, the waste shall be classified as hazardous according to HP 4.

If the sum of the concentrations of all substances classified as H318 exceeds or equals 10 %, the waste shall be classified as hazardous according to HP 4.

If the sum of the concentrations of all substances classified H315 and H319 exceeds or equals 20 %, the waste shall be classified as hazardous according to HP 4.

Note that wastes containing substances classified as H314 (Skin corr.1A, 1B or 1C) in amounts greater than or equal to 5 % will be classified as hazardous by HP 8. HP 4 will not apply if the waste is classified as HP 8.

**Table 14:** Hazard Class, Category Code(s) and Hazard Statement Code(s) for waste constituents and the corresponding concentration limits for the classification of wastes as hazardous by HP 4

| Hazard Class and Category Code(s) | Hazard statement Code(s) | Description                                              | Concentration limit (total of substances) |
|-----------------------------------|--------------------------|----------------------------------------------------------|-------------------------------------------|
| Skin Corr. 1A                     | H314                     | Causes severe skin burns and eye damage                  | $\geq 1\%$ and $< 5\%$                    |
| Eye Dam. 1                        | H318                     | Causes serious eye damage                                | $\geq 10\%$                               |
| Skin irrit. 2 and Eye irrit. 2    | H315 and H319            | Causes skin irritation and Causes serious eye irritation | $\geq 20\%^{14}$                          |

14) Please be aware that the criteria of 20% for H315 and H319 may only be applied if the compound is classified as H315 and H319 /34 - OVAM 2015/. If the compound is only classified as H315 or only as H319 the waste will not fall under HP4. For example sulphur is only classified as H315, not as H319. Therefore the presence of sulphur will not make a waste hazardous.

An example for the assessment of wastes containing CaO and Ca(OH)<sub>2</sub> according HP 4 can be found in chapter 7.9.

Where a waste contains a substance that is H314 Skin Corr.1A, 1B or 1C at a concentration  $\geq 5\%$  see also HP 8 Corrosive (chapter 9.8 of this document) as this waste shall be classified as hazardous by HP 8 and not by HP 4.

Above mentioned concentration limits are applied to the known components of a waste. It may be difficult to identify all specific substances present in certain wastes. Where the waste is not 'Irritant' as a result of the known substances and some substances are still unknown, the pH value of the waste should be used for assessment (see **Error! Reference source not found.**).

A waste with a pH  $\leq 2$  or  $\geq 11.5$  should be considered HP 8 Corrosive unless both:

☐ an acid or alkali reserve test suggests that the classification as 'Corrosive' is not warranted, and further in vitro testing has confirmed that classification (as 'Irritant' or neither 'Irritant'/'Corrosive')

The acid/ alkali reserve test measures the buffering capacity of the waste. More information on acid/alkali reserve test can be found in 'Test No. 122: Determination of pH, Acidity and Alkalinity' within the OECD Guidelines for the Testing of Chemicals ([http://www.oecd-ilibrary.org/environment/test-no-122-determination-of-ph-acidity-and-alkalinity\\_9789264203686-en](http://www.oecd-ilibrary.org/environment/test-no-122-determination-of-ph-acidity-and-alkalinity_9789264203686-en)) or in /43 - Young et al. 1988/.



### Cut-off values

The following cut-off values apply to the assessment:

- H314, H315, H318 and H319 the cut off value is 1 %.

An individual substance present at a concentration below this cut off value is not included in the total concentrations given in **Error! Reference source not found.** and **Error! Reference source not found.**

### Flow chart of the assessment process for HP 4

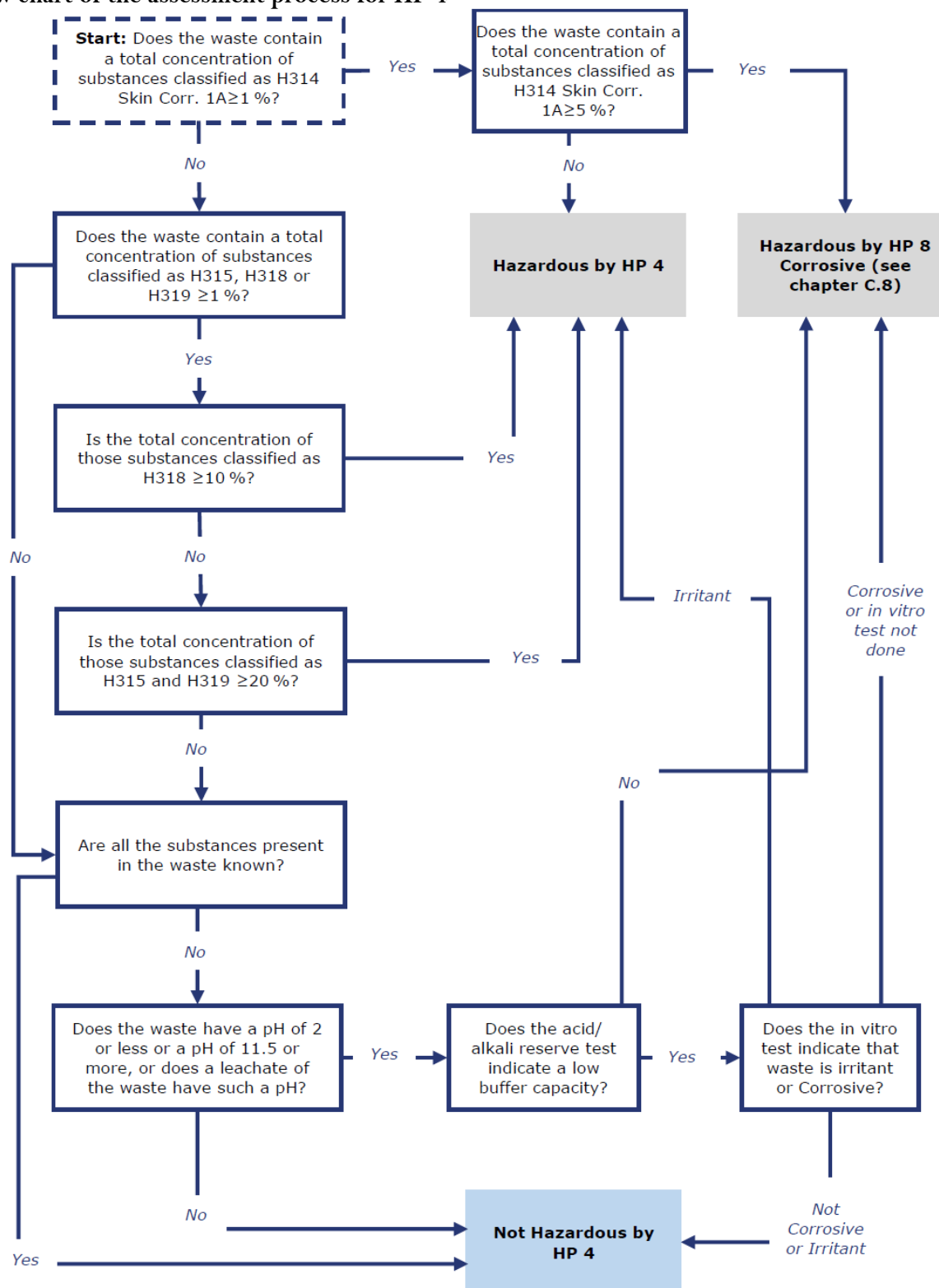


Figure 6: Flow chart for the determination of HP 4 (Adjusted from /37 - UK EA 2015/)

## Test Methods

A HP 4 assessment of a waste is to be done on the basis of

- identification of the individual substances in the waste;
- their classification;
- reference to concentration limits in Annex III to WFD (see chapter 11 in this Appendix 5)

If testing is considered to determine this hazard property, waste containing substances listed in Table 13 should be tested for irritant properties in accordance with the section 3.2 of /23 - ECHA 2013/. A mixture assigned H315, H318 or H319 by this assessment is considered HP 4.

If testing is considered, a combination of acid/ alkali reserve test and in-vitro testing is recommended. An example on how to integrate the acid/ alkali reserve and in-vitro testing into a general testing setting can be found in /37 - UK EA 2015/.

As already described above, the acid/ alkali reserve test measures the buffering capacity of the waste. More information on acid/alkali reserve test can be found in 'Test No. 122: Determination of pH, Acidity and Alkalinity' within the OECD Guidelines for the Testing of Chemicals or in /43 - Young et al. 1988/.

Part B of the Annex to the Test Methods Regulation provides the following test method which may be regarded in the assessment of HP 4 'Irritant':

### B.46 In Vitro Skin Irritation: Reconstructed Human Epidermis Test Method

Test methods given in the Test Methods Regulation that rely on animal testing are not appropriate. Further in-vitro methods may be available from other sources, such as the European Union Reference Laboratory for alternatives to animal testing (<https://eurl-ecvam.jrc.ec.europa.eu>).

Where a hazardous property of a waste has been assessed by a test and by using the concentrations of hazardous substances as indicated in Annex III to the WFD, the results of the test shall prevail.

## 9.5 Determining HP 5: Specific Target Organ Toxicity (STOT) / Aspiration Toxicity

### Definition and further description of Annex III to WFD

Annex III to WFD (see chapter 11 in this Appendix 5) defines HP 5 'Specific Target Organ Toxicity (STOT)/ Aspiration Toxicity' as:

*'waste which can cause specific target organ toxicity either from a single or repeated exposure, or which cause acute toxic effects following aspiration'*

The WFD further explains that:

*'When a waste contains one or more substances classified by one or more of the following hazard class and category codes and hazard statement codes shown in **Error! Reference source not found.** and one or more of the concentration limits in **Error! Reference source not found.** of this document] is exceeded or equalled, the waste shall be classified as hazardous according to HP 5.*

*When substances classified as STOT are present in a waste, an individual substance has to be present at or above the concentration limit for the waste to be classified as hazardous by HP 5.*

*When a waste contains one or more substances classified as Asp. Tox. 1 and the sum of those substances exceeds or equals the concentration limit, the waste shall be classified as hazardous by HP 5 only where the overall kinematic viscosity (at 40°C) does not exceed 20.5 mm<sup>2</sup>/s.[Footnote: The kinematic viscosity shall only be determined for fluids]'*

Table 15: Hazard Class, Category Code(s) and Hazard Statement Code(s) for waste constituents and the corresponding concentration limits for the classification of wastes as hazardous by HP 5

| Hazard Class and Category Code(s) | Hazard statement Code(s) | Description                                                       | Concentration limit |
|-----------------------------------|--------------------------|-------------------------------------------------------------------|---------------------|
| STOT SE 1                         | H370                     | Causes damage to organs                                           | ≥ 1 % (Indiv.)      |
| STOT SE 2                         | H371                     | May cause damage to organs                                        | ≥ 10 % (Indiv.)     |
| STOT SE 3                         | H335                     | May cause respiratory irritation                                  | ≥ 20 % (Indiv.)     |
| STOT RE 1                         | H372                     | Causes damage to organs through prolonged or repeated exposure    | ≥ 1 % (Indiv.)      |
| STOT RE 2                         | H373                     | May cause damage to organs through prolonged or repeated exposure | ≥ 10 % (Indiv.)     |
| Asp. Tox. 1                       | H304                     | May be fatal if swallowed and enters airways                      | ≥ 10 %(total)       |

An example for the assessment of wastes containing CaO and Ca(OH)<sub>2</sub> according HP 5 can be found in chapter 7.9.

**Flow chart** of the determination process for the HP 5.

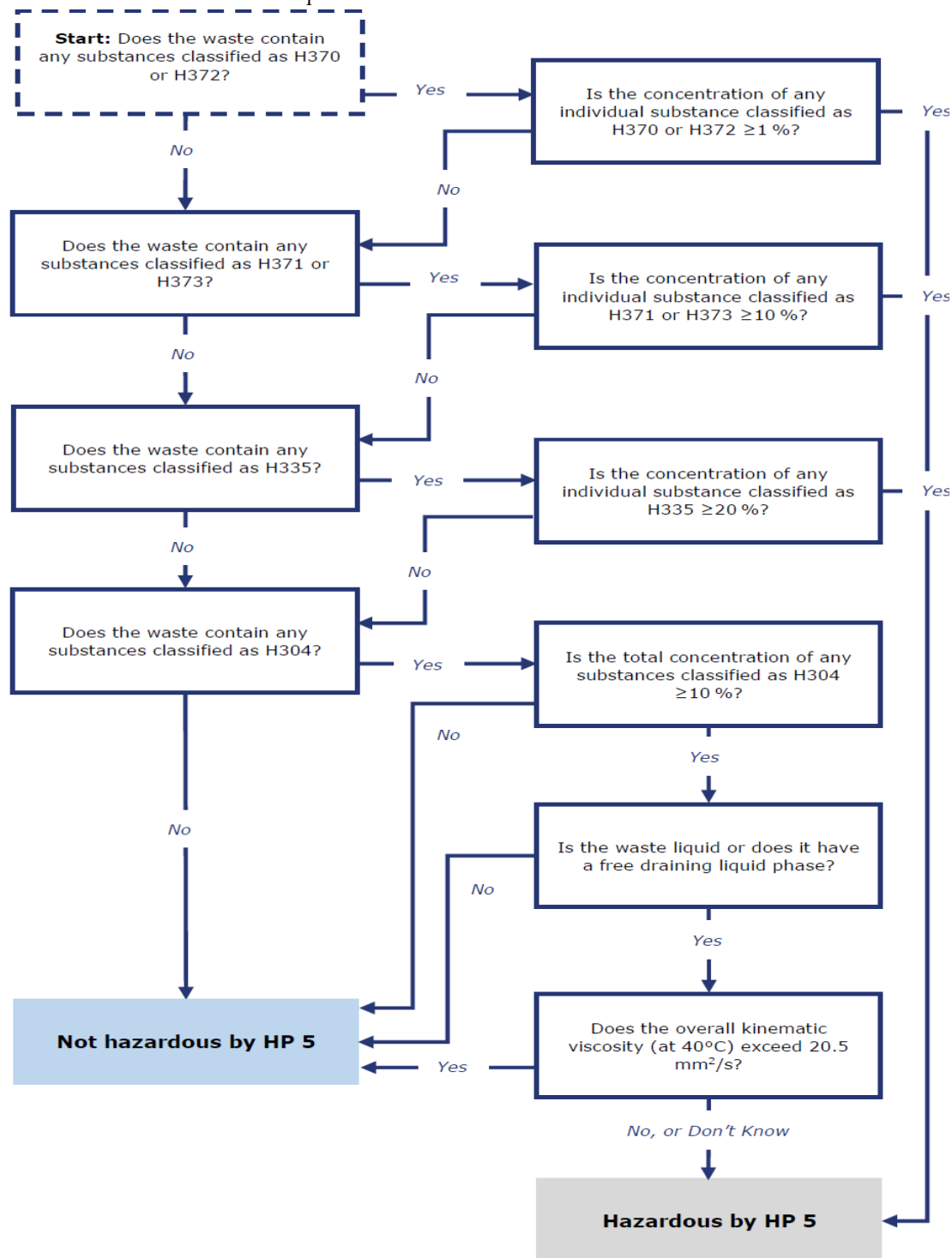


Figure 7: Flow chart for the assessment of HP5 (Adjusted from /37 - UK EA 2015/)

### Test Methods

A HP 5 assessment of a waste is made based on the identification of the individual substances in the waste;

- their classification;
- reference to concentration limits.

If testing is considered when determining this hazard property, waste containing substances listed in **Error! Reference source not found.** should be assessed for specific target organ toxicity and aspiration toxicity properties in accordance with the section 3.8 of /35 - ECHA 2013/.

Test methods given in the Test Methods Regulation that rely on animal testing are not appropriate. Further in-vitro methods may be available from other sources, such as the European Union Reference Laboratory for alternatives to animal testing (<https://eurl-ecvam.jrc.ec.europa.eu>).

Where a hazardous property of a waste has been assessed by a test and by using the concentrations of hazardous substances as indicated Annex III to WFD (see chapter 11 in this Appendix 5), the results of the test shall prevail.

### 9.6 Determining HP 6: Acute Toxicity

#### Definition and further description of Annex III to WFD

Annex III to the WFD defines HP 6 'Acute Toxicity' as:

*'waste which can cause acute toxic effects following oral or dermal administration, or inhalation exposure'.*

The WFD further explains that:

*If the sum of the concentrations of all substances contained in a waste, classified with an acute toxic hazard class and category code and hazard statement code given in **Error! Reference source not found.** exceeds or equals the threshold given in that table, the waste shall be classified as hazardous by HP 6. When more than one substance classified as acute toxic is present in a waste, the sum of the concentrations is required only for substances within the same hazard category.*

#### Cut-off values

The following cut-off values apply to the assessment:

- for H300, H310, H330, H301, H311, and H331 : 0.1 %
- for H302, H312, H332): 1 %.

An individual substances present at a concentration below the cut off, for a hazard statement code assigned to it, is not included in the sum of the concentrations for that hazard class and category code.

Table 16: Hazard Class, Category Code(s) and Hazard Statement Code(s) for waste constituents and the corresponding concentration limits for the classification of wastes as hazardous by HP 6

| Hazard Class and Category Code(s) | Hazard statement Code(s) | Description                  | Concentration limit (sum of substances) |
|-----------------------------------|--------------------------|------------------------------|-----------------------------------------|
| Acute Tox.1 (Oral)                | H300                     | Fatal if swallowed           | $\geq 0.1 \%$                           |
| Acute Tox. 2 (Oral)               | H300                     | Fatal if swallowed           | $\geq 0.25 \%$                          |
| Acute Tox. 3 (Oral)               | H301                     | Toxic if swallowed           | $\geq 5 \%$                             |
| Acute Tox.4 (Oral)                | H302                     | Harmful if swallowed         | $\geq 25 \%$                            |
| Acute Tox.1 (Dermal)              | H310                     | Fatal in contact with skin   | $\geq 0.25 \%$                          |
| Acute Tox.2 (Dermal)              | H310                     | Fatal in contact with skin   | $\geq 2.5 \%$                           |
| Acute Tox.3 (Dermal)              | H311                     | Toxic in contact with skin   | $\geq 15 \%$                            |
| Acute Tox. 4 (Dermal)             | H312                     | Harmful in contact with skin | $\geq 55 \%$                            |
| Acute Tox.1 (Inhal.)              | H330                     | Fatal if inhaled             | $\geq 0.1 \%$                           |
| Acute Tox.2 (Inhal.)              | H330                     | Fatal if inhaled             | $\geq 0.5 \%$                           |
| Acute Tox. 3 (Inhal.)             | H331                     | Toxic if inhaled             | $\geq 3.5 \%$                           |
| Acute Tox. 4 (Inhal.)             | H332                     | Harmful if inhaled           | $\geq 22.5 \%$                          |

### Flow chart of the determination process for HP 6

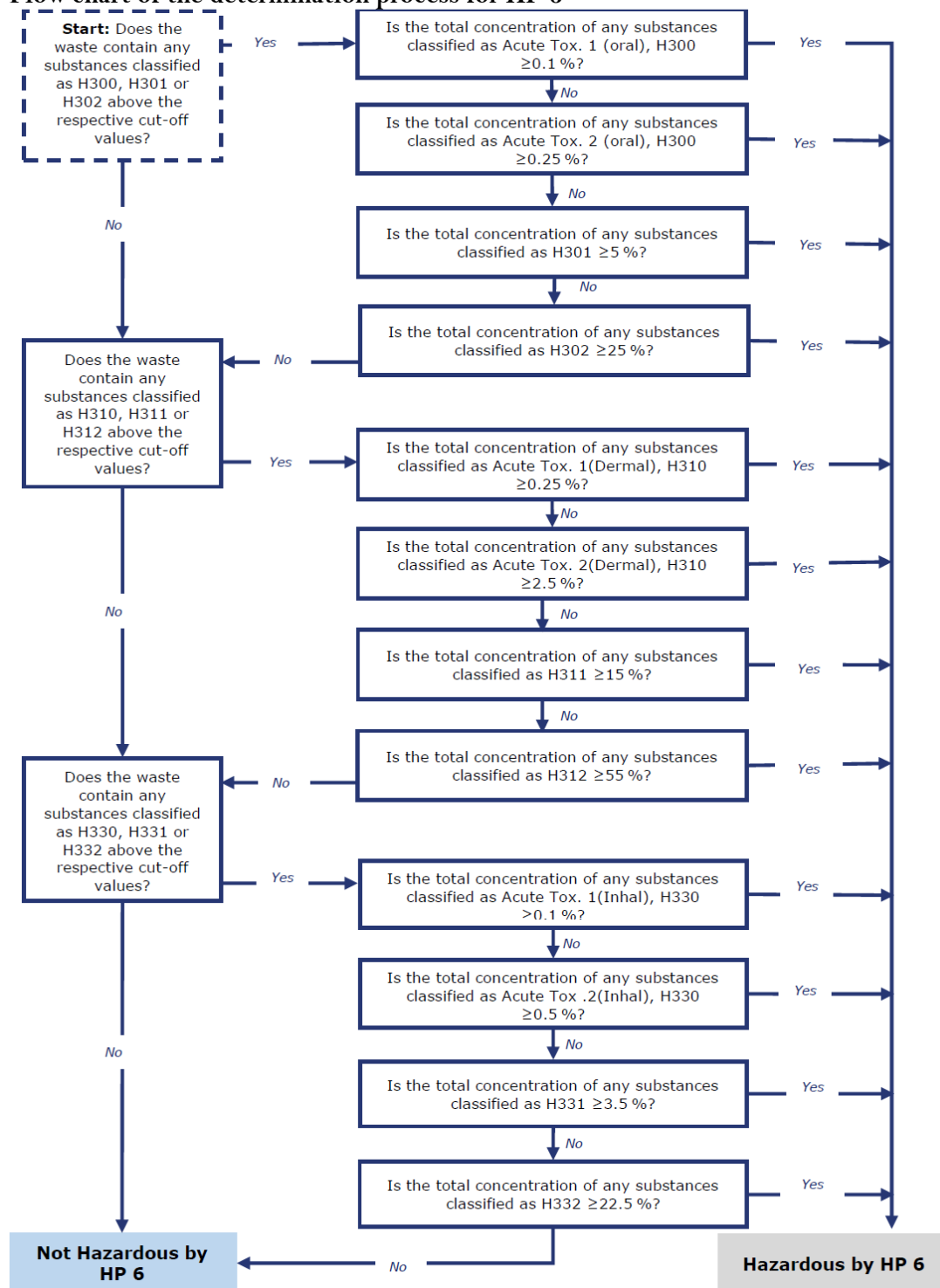


Figure 8: Flow chart for the determination of HP 6 (Adjusted from /37 - UK EA 2015/)



### Test Methods

A HP 6 assessment of a waste is to be made on the basis of the identification of the individual substances in the waste;

- their classification;
- reference to concentration limits

If testing is considered to determining this hazard property, waste containing substances listed in **Error! Reference source not found.** should be assessed for acute toxicity properties in accordance with the section 3.1 of /23 - ECHA 2013/.

Test methods given in the Test Methods Regulation that rely on animal testing are not appropriate. Further in-vitro methods may be available from other sources, such as the European Union Reference Laboratory for alternatives to animal testing (<https://eurl-ecvam.jrc.ec.europa.eu>).

Where a hazardous property of a waste has been assessed by a test and by using the concentrations of hazardous substances as indicated in Annex III to WFD (see chapter 11 in this Appendix 5), the results of the test shall prevail.

## 9.7 Determining HP 7: Carcinogenic

### Definition and further description of Annex III to WFD

Annex III to WFD (see chapter 11 in this Appendix 5) defines HP 7 'Carcinogenic' as:

*'waste which induces cancer or increases its incidence'*

The WFD further explains that:

*'When a waste contains a substance classified by one of the following hazard class and category codes and hazard statement codes and exceeds or equals one of the following concentration limits shown in **Error! Reference source not found.** the waste shall be classified as hazardous by HP 7. When more than one substance classified as carcinogenic is present in a waste, an individual substance has to be present at or above the concentration limit for the waste to be classified as hazardous by HP 7.'*

Table 17: Hazard Class, Category Code(s) and Hazard Statement Code(s) for waste constituents and the corresponding concentration limits for the classification of wastes as hazardous by HP 7

| Hazard Class and Category Code(s) | Hazard statement Code(s) | Description                 | Concentration limit (Individual substance) |
|-----------------------------------|--------------------------|-----------------------------|--------------------------------------------|
| Carc. 1A                          | H350                     | May cause cancer            | $\geq 0.1 \%$                              |
| Carc. 1B                          |                          |                             |                                            |
| Carc. 2                           | H351                     | Suspected of causing cancer | $\geq 1.0 \%$                              |

An example for the assessment of asbestos according HP 7 can be found in chapter

**Flow chart of the determination process for HP 7**

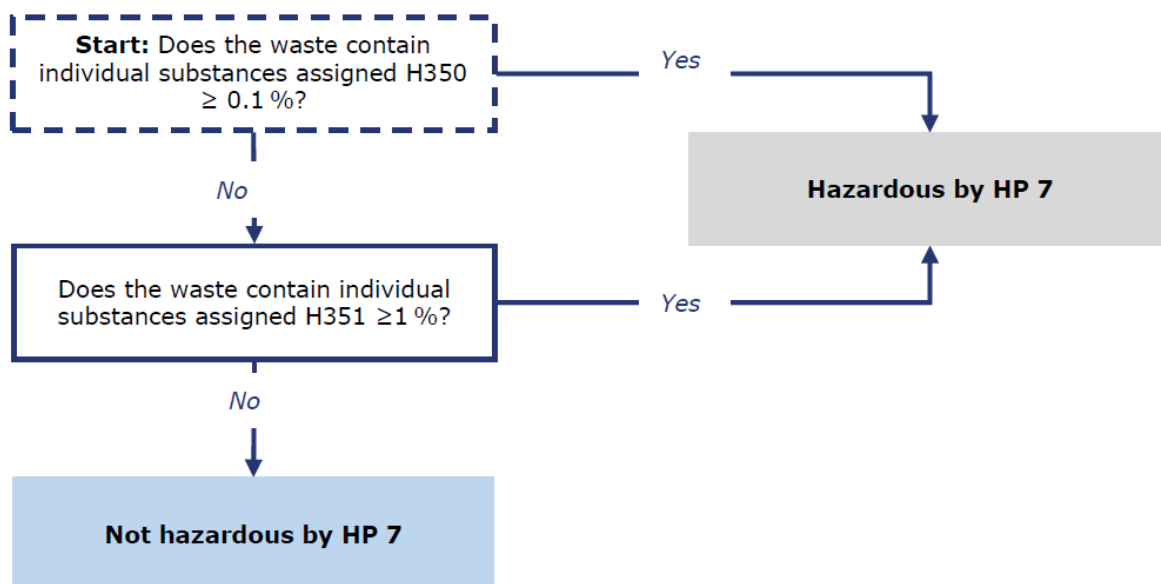


Figure 9: Flow chart for the determination of HP 7 (Adjusted from /37 - UK EA 2015/)

### Test Methods

A HP 7 assessment of a waste is to be done based on the identification of the individual substances in the waste;

- their classification;
- reference to concentration limits

If testing is considered to determining this hazard property, waste containing substances listed in **Error! Reference source not found.** should be assessed for carcinogenic properties in accordance with the section 3.6 of /23 - ECHA 2013/.

Please note that testing to determine carcinogenicity is neither envisaged for waste nor for mixtures in the CLP Regulation. Mutagenicity tests (see chapter 9.11- HP 11) are considered in many cases to be a suitable indicator of potential carcinogenicity.

## 9.8 Determining HP 8: Corrosive

### Definition and further description of Annex III to WFD

Annex III to WFD (see chapter 11 in this Appendix 5) defines HP 8 'Corrosive' as:

*'waste which on application can cause skin corrosion'*

Hazards HP 8 and HP 4 are linked because they refer to the potential for harm or damage to tissue at different levels of severity. See 9.4 for further details.

The WFD further explains that:

*'When a waste contains one or more substances classified as Skin corr.1A, 1B or 1C (H314) and the sum of their concentrations exceeds or equals 5 %, the waste shall be classified as hazardous by HP 8.'*

Table 18: Hazard Class, Category Code(s) and Hazard Statement Code(s) for waste constituents and the corresponding concentration limits for the classification of wastes as hazardous by HP 8

| Hazard Class and Category Code(s) | Hazard statement Code(s) | Description                             | Concentration limit (Sum of substances) |
|-----------------------------------|--------------------------|-----------------------------------------|-----------------------------------------|
| Skin corr. 1A, 1B, or 1C          | H314                     | Causes severe skin burns and eye damage | ≥ 5 %                                   |

For cases where a waste contains

- a substance to be classified as H314 Skin Corr.1A
- at a concentration  $\geq 1 \%$  and  $\leq 5 \%$

see also HP 4 Irritant (chapter 9.4 of this document).

### Cut-off values

The following cut-off values apply to the assessment:

- For H314 : 1 %.

An individual substance present at a concentration below this cut off value is not included in the sum of the concentrations for H314.

# Flow chart of the determination process for HP 8

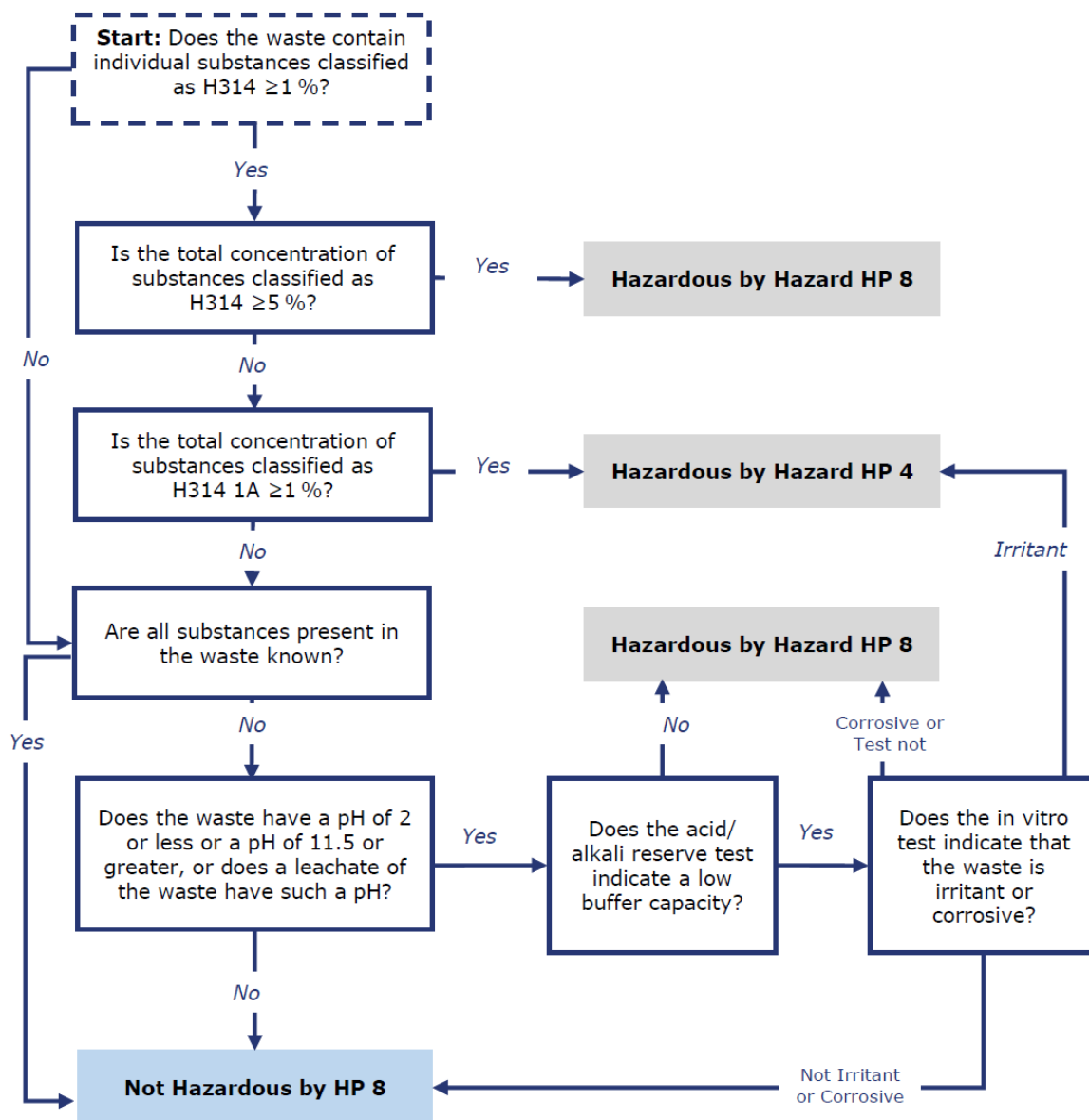


Figure 10: Flow chart for the determination of HP 8 (Adjusted from /37 - UK EA 2015/)

### Test Methods

A HP 8 assessment of a waste is made on the basis of identification of the individual substances in the waste;

- their classification;
- reference to concentration limits in Annex III of the Waste Framework Directive

If testing is considered to determining this hazard property, waste containing substances listed in **Error! Reference source not found.** should be assessed for corrosive and irritant properties Final Report on a study to develop a guidance document on the definition and classification of waste in accordance with the section 3.2 of /23 - ECHA 2013/. A mixture assigned H314 by this assessment is considered as hazardous by HP 8.

Part B of the Annex to the Test Methods Regulation provides the following in-vitro test methods which may be regarded in the assessment of HP 8 'Corrosive':

- B.40. In Vitro Skin Corrosion: Transcutaneous Electrical Resistance Test (TER)
- B.40 BIS. In Vitro Skin Corrosion: Human Skin Model Test

Test methods given in the Test Methods Regulation that rely on animal testing are not appropriate.

Where a hazardous property of a waste has been assessed by a test and by using the concentrations of hazardous substances as indicated in Annex III to the WFD, the results of the test shall prevail.

### 9.9 Determining HP 9: Infectious

#### Definition and further description of Annex III to WFD

Annex III to the WFD defines HP 9 'Infectious' as:

*'waste containing viable micro-organisms or their toxins which are known or reliably believed to cause disease in man or other living organisms.'*

#### Remarks on the assessment process for HP 9

Toxins from micro-organisms have to be assessed analogously to chemical substances by considering their assigned hazard statement codes and associated hazardous properties. There are no hazard statement codes for infectious micro-organisms as they are not considered as hazardous substances under the CLP Regulation /1/.

The assessment of HP 9 depends on a reference to categories of specific risk groups of organisms according their potential to cause and spread infection and their potential clinical treatment /38 - UNEP 2004/.

Therefore /42 - WHO 2004/ provides a widely recognized system categorising organisms according four risk groups:

- Risk Group 4 (high individual risk, high community risk);
- Risk Group 3 (high individual risk, low community risk);
- Risk Group 2 (moderate individual risk, low community risk);
- Risk Group 1 (low individual and community risk).

More information can be found in /42 - WHO 2004/. /39 - UN 2015/ has taken up this approach and set up an indicative list of infectious substances (see *Table 11*).

**Table 19: Indicative examples of infectious substances included in category A taken from Table 2.6.3.2.2.1 in /39 - UN 2015/**

| UN Number and Proper Shipping Name                                                                                | Micro-organism                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Indicative examples of infectious substances included in category A in any form unless otherwise indicated</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>UN 2814</b><br>Infectious substances affecting humans                                                          | <ul style="list-style-type: none"> <li>▪ Bacillus anthracis (cultures only)</li> <li>▪ Brucella abortus (cultures only)</li> <li>▪ Brucella melitensis (cultures only)</li> <li>▪ Brucella suis (cultures only)</li> <li>▪ Burkholderia mallei - Pseudomonas mallei – Glanders (cultures only)</li> <li>▪ Burkholderia pseudomallei – Pseudomonas pseudomallei (cultures only)</li> <li>▪ Chlamydia psittaci - avian strains (cultures only)</li> <li>▪ Clostridium botulinum (cultures only)</li> </ul> |

| UN Number and Proper Shipping Name                                                                         | Micro-organism                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Indicative examples of infectious substances included in category A in any form unless otherwise indicated |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                                                                                                            | <ul style="list-style-type: none"> <li>▪ Coccidioides immitis (cultures only)</li> <li>▪ Coxiella burnetii (cultures only)</li> <li>▪ Crimean-Congo haemorrhagic fever virus</li> <li>▪ Dengue virus (cultures only)</li> <li>▪ Eastern equine encephalitis virus (cultures only)</li> <li>▪ Escherichia coli, verotoxigenic (cultures only)</li> <li>▪ Ebola virus</li> <li>▪ Flexal virus</li> <li>▪ Francisella tularensis (cultures only)</li> <li>▪ Guanarito virus</li> <li>▪ Hantaan virus</li> <li>▪ Hantaviruses causing haemorrhagic fever with renal syndrome</li> <li>▪ Hendra virus</li> <li>▪ Hepatitis B virus (cultures only)</li> <li>▪ Herpes B virus (cultures only)</li> <li>▪ Human immunodeficiency virus (cultures only)</li> <li>▪ Highly pathogenic avian influenza virus (cultures only)</li> <li>▪ Japanese Encephalitis virus (cultures only)</li> <li>▪ Junin virus</li> <li>▪ Kyasanur Forest disease virus</li> <li>▪ Lassa virus</li> <li>▪ Machupo virus</li> <li>▪ Marburg virus</li> <li>▪ Monkeypox virus</li> <li>▪ Mycobacterium tuberculosis (cultures only)</li> <li>▪ Nipah virus</li> <li>▪ Omsk haemorrhagic fever virus</li> <li>▪ Poliovirus (cultures only)</li> <li>▪ Rabies virus (cultures only)</li> <li>▪ Rickettsia prowazekii (cultures only)</li> <li>▪ Rickettsia rickettsii (cultures only)</li> <li>▪ Rift Valley fever virus (cultures only)</li> <li>▪ Russian spring-summer encephalitis virus (cultures only)</li> <li>▪ Sabia virus</li> <li>▪ Shigella dysenteriae type 1 (cultures only)</li> <li>▪ Tick-borne encephalitis virus (cultures only)</li> <li>▪ Variola virus</li> <li>▪ Venezuelan equine encephalitis virus (cultures only)</li> <li>▪ West Nile virus (cultures only)</li> <li>▪ Yellow fever virus (cultures only)</li> <li>▪ Yersinia pestis (cultures only)</li> </ul> |

| UN Number and Proper Shipping Name                                                                                | Micro-organism                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Indicative examples of infectious substances included in category A in any form unless otherwise indicated</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>UN 2900</b><br>Infectious substances                                                                           | <ul style="list-style-type: none"> <li>▪ African swine fever virus (cultures only)</li> <li>▪ Avian paramyxovirus Type 1 - Velogenic Newcastle disease virus (cultures only)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                   |
| affecting animals only                                                                                            | <ul style="list-style-type: none"> <li>▪ Classical swine fever virus (cultures only)</li> <li>▪ Foot and mouth disease virus (cultures only)</li> <li>▪ Lumpy skin disease virus (cultures only)</li> <li>▪ Mycoplasma mycoides - Contagious bovine pleuropneumonia (cultures only)</li> <li>▪ Peste des petits ruminants virus (cultures only)</li> <li>▪ Rinderpest virus (cultures only)</li> <li>▪ Sheep-pox virus (cultures only)</li> <li>▪ Goatpox virus (cultures only)</li> <li>▪ Swine vesicular disease virus (cultures only)</li> <li>▪ Vesicular stomatitis virus (cultures only)</li> </ul> |

Infectious substances (including wastes contaminated with such substances, such as medial or clinical wastes) in category A (as well as cultures of infectious substances of category B) must be classified under transport regulations, as

- UN 2814 "infectious substance, affecting humans", or
- UN 2900 "infectious substance, affecting animals only".

Considering the classification applied by /39 - UN 2015/, without testing, a reasoned judgment can be made whether the waste under consideration has to be classified as hazardous waste by HP 9.

In this regard [UK EA 2015] mentions two general aspects for the assessment of HP 9: In case it has to be decided if it contains a toxin produced by a micro-organism in a concentration that the waste displays the hazardous property HP 5 (Specific Target Organ Toxicity/ Aspiration Toxicity, see chapter 7.5) or HP 6 (Acute Toxicity, see chapter 7.6). Wastes that might be infectious due to microbial toxins include dredging's or skimming's from water bodies where a cyanobacterial bloom has occurred. It needs to be identified whether relevant healthcare wastes can be associated with infection and have to be classified as infectious.

The following information is directly taken from /37 - UK EA 2015/ which states that special requirements apply when:

- the source person or animal (the patient), is known or suspected to have a disease / infection caused by a micro-organism or its toxin and the waste is likely to contain the viable infectious agent or toxin; or
- the waste is, or is contaminated with, a culture or an enrichment of a micro-organism or its toxin that may cause disease in man or other living animals; or

- the waste may cause infection to any person or animal coming into contact with it.

According to /37 - UK EA 2015/, special requirements should be determined by clinical assessment of each waste item and patient, as follows:

- clinical assessment should be carried out by a healthcare professional who is familiar with the type of waste generated, the current medical condition and, where feasible, the past medical history of the patient

It is unlikely that it will always be practical, or possible, to identify specific pathogens or toxins within the waste when a patient first presents symptoms as definitive laboratory identification requires time to undertake.

The procedure for determining whether a waste is considered hazardous by HP 9 must therefore, where this is the case, assume that the disease causing agent has not been confirmed and should be based on clinical assessment of whether an unidentified infection of any type is suspected or known.

All pathogens and microbial toxins should be included in the assessment. HP 9 does not consider the severity of the disease.

Any waste classified as hazardous by virtue of HP 9 Infectious shall be kept separately from other waste to prevent contamination.

### Test Methods

There are no test methods given in the Test Methods Regulation.

### 9.10 Determining HP 10: Toxic for reproduction

#### Definition and further description of Annex III to WFD

Annex III to WFD (see chapter 11 in this Appendix 5) defines HP 10 'Toxic for reproduction' as: 'waste which has adverse effects on sexual function and fertility in adult males and females, as well as developmental toxicity in the offspring'

The WFD further explains that:

*'When a waste contains a substance classified by one of the following hazard class and category codes and hazard statement codes and exceeds or equals one of the following concentration limits shown in **Error! Reference source not found.** the waste shall be classified hazardous according to HP 10. When more than one substance classified as toxic for reproduction is present in a waste, an individual substance has to be present at or above the concentration limit for the waste to be classified as hazardous by HP 10.'*

Table 20: Hazard Class, Category Code(s) and Hazard Statement Code(s) for waste constituents and the corresponding concentration limits for the classification of wastes as hazardous by HP 10

| Hazard Class and Category Code(s) | Hazard statement Code(s) | Description                                         | Concentration limit (Individual substance) |
|-----------------------------------|--------------------------|-----------------------------------------------------|--------------------------------------------|
| Repr. 1A                          | H360                     | May damage fertility or the unborn child            | ≥ 0.3 %                                    |
| Repr. 1B                          |                          |                                                     |                                            |
| Repr. 2                           | H361                     | Suspected of damaging fertility or the unborn child | ≥ 3.0 %                                    |

#### Flow chart

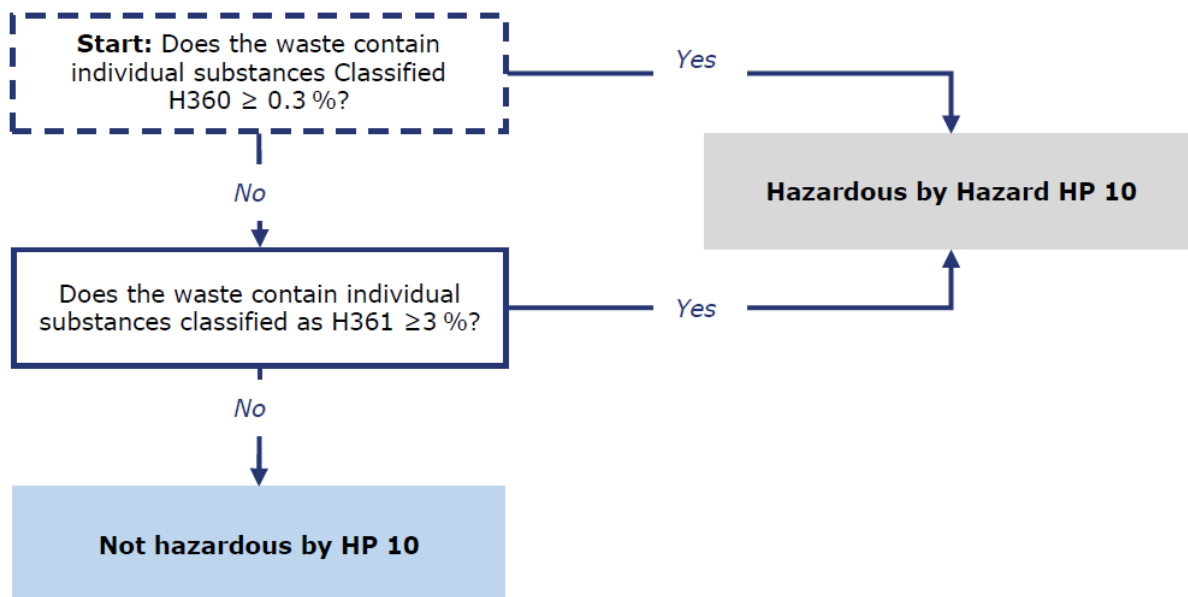


Figure 11: Sets out the assessment process for HP 10.

#### Test Methods

A HP 10 assessment of a waste is to be made on the basis of the identification of the individual substances in the waste;

- their classification;
- reference to concentration limits

If testing is considered to determining this hazard property, waste containing substances listed in **Error! Reference source not found.** should be assessed for toxic for reproduction properties in accordance with the section 3.7 of /23 - ECHA 2013/.

Please note that there are very limited options for testing reproductive toxicity properties in-vitro. Test methods given in the Test Methods Regulation mainly rely on animal testing and thus are not appropriate. Further in-vitro methods may be available from other sources, such as the European Union Reference Laboratory for alternatives to animal testing (<https://eurl-ecvam.jrc.ec.europa.eu>)

### 9.11 Determining HP 11: Mutagenic

#### Definition and further description of Annex III to WFD

Annex III to WFD (see chapter 11 in this Appendix 5) defines HP 11 'Mutagenic' as:

*'waste which may cause a mutation, that is a permanent change in the amount or structure of the genetic material in a cell'*

The WFD further explains that:

*'When a waste contains a substance classified by one of the following hazard class and category codes and hazard statement codes and exceeds or equals one of the following concentration limits shown in **Error! Reference source not found.** the waste shall be classified hazardous according to HP 11. When more than one substance classified as toxic for reproduction is present in a waste, an individual substance has to be present at or above the concentration limit for the waste to be classified as hazardous by HP 11.'*

Table 21: Hazard Class, Category Code(s) and Hazard Statement Code(s) for waste constituents and the corresponding concentration limits for the classification of wastes as hazardous by HP 11 Mutagenic

| Hazard Class and Category Code(s) | Hazard statement Code(s) | Description                          | Concentration limit (Individual substance) |
|-----------------------------------|--------------------------|--------------------------------------|--------------------------------------------|
| Muta. 1A                          | H340                     | May cause genetic defects            | ≥ 0.1 %                                    |
| Muta. 1B                          |                          |                                      |                                            |
| Muta. 2                           | H341                     | Suspected of causing genetic defects | ≥ 1.0 %                                    |

## Flow chart

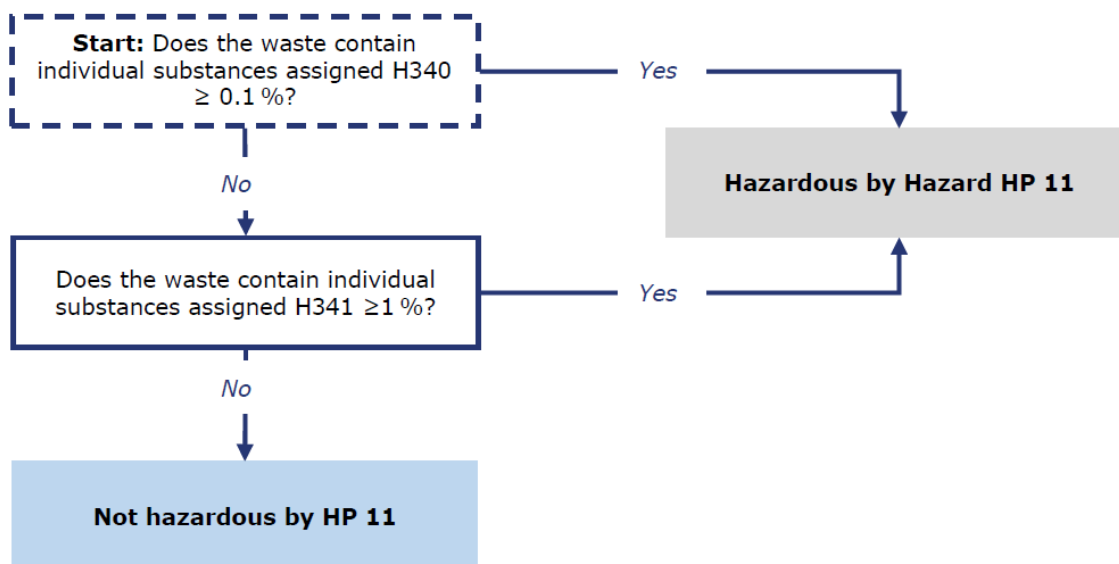


Figure 12: The determination process for HP 11

## Test Methods

A HP 11 assessment of a waste is to be made on the basis of the identification of the individual substances in the waste;

- their classification;
- reference to concentration limits

If testing is considered to determining this hazard property, waste containing substances listed in **Error! Reference source not found.** should be assessed for mutagenic properties in accordance with the section 3.5 of the /23 - ECHA 2013/.

Part B of the Annex to the Test Methods Regulation /44/ provides the following in-vitro test methods which may be regarded in the assessment of HP 11 'Mutagenic':

- B.10. Mutagenicity – In Vitro Mammalian Chromosome Aberration Test
- B.13/14. Mutagenicity: Reverse Mutation Test Using Bacteria
- B.15. Mutagenicity Testing and Screening for Carcinogenicity Gene Mutation – *Saccharomyces Cerevisiae*
- B.17. Mutagenicity – In Vitro Mammalian Cell Gene Mutation Test

Test methods given in the Test Methods Regulation that rely on animal testing are not appropriate.

## 9.12 Determining HP 12: Release of an acute toxic gas

### Definition and further description of Annex III to WFD

Annex III to the WFD defines HP 12 'Release of an acute toxic gas' as:

*'waste which releases acute toxic gases (Acute Tox. 1, 2 or 3) in contact with water or an acid'*

The WFD further explains that:

*'When a waste contains a substance assigned to one of the following supplemental hazards EUH029, EUH031 and EUH032, it shall be classified as hazardous by HP 12 according to test methods or guidelines.'*

A waste containing substances that are assigned EUH029, EUH031 and EUH032 can be tested to show whether it displays that hazardous property or not. Otherwise a waste containing those substances can simply be assumed to be hazardous by HP 12.

*Table 22: Hazard statements and supplemental hazards for waste constituents for the classification of wastes as hazardous by HP 12*

| Hazard Statement(s) / Supplemental Hazard(s) |        |
|----------------------------------------------|--------|
| Contact with water liberates toxic gas       | EUH029 |
| Contact with acids liberates toxic gas       | EUH031 |
| Contact with acids liberates very toxic gas  | EUH032 |

### Flow chart

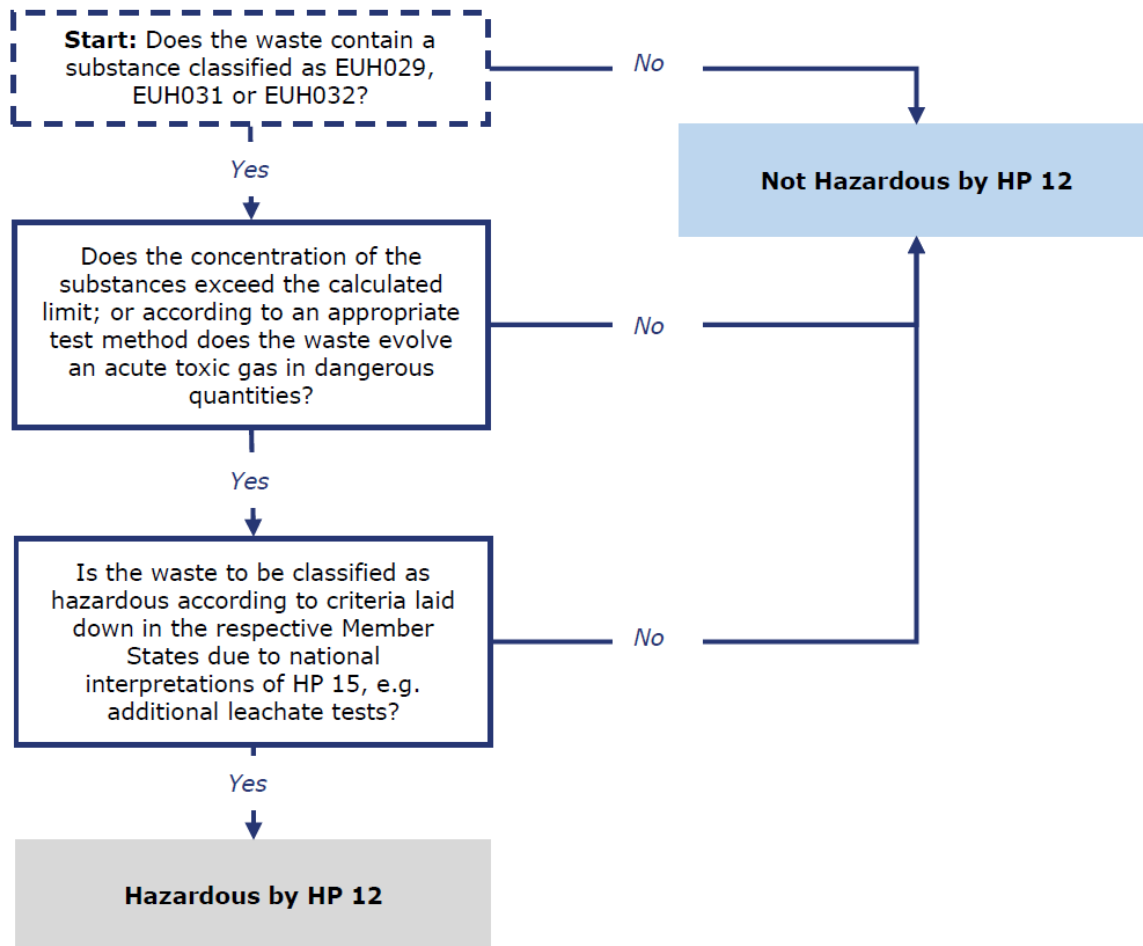


Figure 13: Flow chart for the determination of HP 12 (Adjusted from /37 - UK EA 2015/)

### Calculation method

A detailed example on a possible calculation method for HP 12 is taken from /37 - UK EA 2015/ and presented in the following.

A substance is assigned EUH029, EUH031 or EUH032 if it is capable of releasing an acute toxic gas<sup>3</sup> when water or acid is added.

If a waste contains a substance assigned EUH029, EUH031 or EUH032, it is possible to calculate the limiting concentration of the substance in the waste that would make it hazardous by HP 12. An example of how to do the calculation is given below in **Error! Reference source not found.**

<sup>3</sup> The gases that are likely to be released include hydrogen sulphide, hydrogen fluoride, carbon disulphide, sulphur dioxide, chlorine, nitrogen dioxide, ammonia and hydrogen cyanide.

#### Calculation method HP 12

1. Write a balanced equation for the reaction that produces the gas. The general form of the equation is:



where R is the EUH029, EUH031 or EUH032 substance, W is water or an acid, P is a product of the reaction, and G is the gas released; r, w, p and g are the stoichiometric ratios that balance the equation.

2. Attribute molecular weights and stoichiometric ratios to the substances in the equation.

3. Divide (r x molar weight of R) by (g x 22.4). This gives the mass of R that will evolve 1 litre of gas. 1 mol of gas occupies 22.4 litres at standard temperature and pressure.

4. Divide this amount (in grams) by 1,000 (to convert to kilograms) and multiply it by 100 to give a percentage by weight, and thus the limiting concentration for HP 12 of substance R.

Example calculation: A waste contains aluminium nitride (AlN). Aluminium nitride is an EUH029 substance which reacts with water to give ammonia gas.



r = 1 mol of AlN, R = 41 g; g = 1 mol NH<sub>3</sub>.

Limiting concentration of aluminium nitride in waste is  $((1 \times 41) / (1 \times 22.4) / 1000) \times 100$ , which is 0.18% (approximately 0.2%).

*Box 2: Calculation method for HP 12 /37 - UK EA 2015]*

Threshold limits derived from the calculations for some EUH029, EUH031 or EUH032 substances are given below in **Error! Reference source not found.**

Table 23: Examples of substances which may cause a waste to exhibit HP 12 and their threshold concentrations\* /37 - UK EA 2015/

| Substance name                                      | Hazard Statement Codes | Equation                                                | Concentration limits for waste to be HP 12 (%) <sup>1</sup> |
|-----------------------------------------------------|------------------------|---------------------------------------------------------|-------------------------------------------------------------|
| Phosphorous pentasulphide                           | EUH029                 | $P_2S_5 + 8H_2O \rightarrow 5H_2S + 2H_3PO_4$           | 0.1                                                         |
| 3,5-dichloro-2,4-difluoro-benzoyl fluoride (DCDFBF) | EUH029                 | $DCDFBF + H_2O \rightarrow HF + Prod.$                  | 1.0                                                         |
| Metam-sodium                                        | EUH031                 | $CH_3NHCS_2Na + H^+ \rightarrow CH_3NH_2 + CS_2 + Na^+$ | 0.5                                                         |
| Barium sulphide                                     | EUH031                 | $BaS + 2H^+ \rightarrow H_2S + Ba^{2+}$                 | 0.8                                                         |
| Barium polysulphides                                | EUH031                 | $BaS_n + 2H^+ \rightarrow H_2S + Ba^{2+} + S_{n-1}$     | 0.8                                                         |
| Calcium sulphide                                    | EUH031                 | $CaS + 2H^+ \rightarrow H_2S + Ca^{2+}$                 | 0.3                                                         |
| Calcium polysulphides                               | EUH031                 | $CaS_n + 2H^+ \rightarrow H_2S + Ca^{2+} + S_{n-1}$     | 0.3                                                         |

\*This is not a complete list of substances with these properties.

| Substance name                                                                                                                   | Hazard Statement Codes | Equation                                                                             | Concentration limits for waste to be HP 12 (%) <sup>1</sup> |
|----------------------------------------------------------------------------------------------------------------------------------|------------------------|--------------------------------------------------------------------------------------|-------------------------------------------------------------|
| Potassium sulphide                                                                                                               | EUH031                 | $K_2S + 2H^+ \rightarrow H_2S + 2K^+$                                                | 0.5                                                         |
| Ammonium polysulphides                                                                                                           | EUH031                 | $(NH_4)_2S_n + 2H^+ \rightarrow H_2S + 2NH_4^+ + S_{n-1}$                            | 0.3                                                         |
| Sodium sulphide                                                                                                                  | EUH031                 | $Na_2S + 2H^+ \rightarrow H_2S + 2Na^+$                                              | 0.4                                                         |
| Sodium polysulphides                                                                                                             | EUH031                 | $Na_2S_n + 2H^+ \rightarrow H_2S + 2Na^+ + S_{n-1}$                                  | 0.4                                                         |
| Sodium dithionite                                                                                                                | EUH031                 | $Na_2O_6S_2 + 2H^+ \rightarrow 2Na^+ + SO_2 + H_2SO_4$                               | 0.9                                                         |
| Sodium hypochlorite, solution Cl active <sup>2</sup>                                                                             | EUH031                 | $2NaOCl + 2H^+ \rightarrow Cl_2 + 2Na^+ + H_2O$                                      | 2.9                                                         |
| Calcium hypochlorite, solution Cl active <sup>2</sup>                                                                            | EUH031                 | $Ca(OCl)_2 + 2H^+ \rightarrow Cl_2 + Ca^{2+} + H_2O$                                 | 0.6                                                         |
| Dichloroisocyanuric acid                                                                                                         | EUH031                 | $C_3HCl_2N_3O_3 + 2H^+ \rightarrow C_3H_3N_3O_3 + Cl_2$                              | 0.9                                                         |
| Dichloroisocyanuric acid, sodium salt of                                                                                         | EUH031                 | $C_3Cl_2N_3O_3Na + 3H^+ \rightarrow C_3H_3N_3O_3 + Cl_2 + Na^+$                      | 1.0                                                         |
| Sodium dichloroisocyanurate, dihydrate                                                                                           | EUH031                 | $C_3Cl_2N_3O_3Na \cdot 2H_2O + 3H^+ \rightarrow C_3H_3N_3O_3 + Cl_2 + Na^+ + 2H_2O$  | 1.1                                                         |
| Trichloroisocyanuric acid                                                                                                        | EUH031                 | $2C_3Cl_3N_3O_3 + 6H^+ \rightarrow 2C_3H_3N_3O_3 + 3Cl_2$                            | 0.7                                                         |
| Hydrogen cyanide, salts of (with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide) | EUH032                 | $NaCN + H^+ \rightarrow HCN + Na^+$                                                  | 0.2                                                         |
| Sodium fluoride                                                                                                                  | EUH032                 | $NaF + H^+ \rightarrow HF + Na^+$                                                    | 0.2                                                         |
| Sodium azide                                                                                                                     | EUH032                 | $NaN_3 + H^+ + H_2O \rightarrow NO_2 + NH_3 + Na^+$                                  | 0.3                                                         |
| Trizinc disphosphide                                                                                                             | EUH032                 | $Zn_3P_2 + 6H^+ \rightarrow 2PH_3 + 3Zn^{2+}$                                        | 0.6                                                         |
| Calcium cyanide                                                                                                                  | EUH032                 | $Ca(CN)_2 + 2H^+ \rightarrow 2HCN + Ca^{2+}$                                         | 0.2                                                         |
| Cadmium cyanide                                                                                                                  | EUH032                 | $Cd(CN)_2 + 2H^+ \rightarrow 2HCN + Cd^{2+}$                                         | 0.4                                                         |
| Aluminium phosphide                                                                                                              | EUH029<br>EUH032       | $AlP + 3H^+ \rightarrow PH_3 + Al^{3+}$<br>$AlP + 3H_2O \rightarrow PH_3 + Al(OH)_3$ | 0.3<br>0.3                                                  |

| Substance name      | Hazard Statement Codes | Equation                                                                                         | Concentration limits for waste to be HP 12 (%) <sup>1</sup> |
|---------------------|------------------------|--------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| Calcium phosphide   | EUH029                 | $\text{Ca}_3\text{P}_2 + 6\text{H}_2\text{O} \rightarrow 2\text{PH}_3 + 3\text{Ca}(\text{OH})_2$ | 0.4                                                         |
| Magnesium phosphide | EUH029<br>EUH032       | $\text{Mg}_3\text{P}_2 + 6\text{H}_2\text{O} \rightarrow 2\text{PH}_3 + 3\text{Mg}(\text{OH})_2$ | 0.3                                                         |
| Trizinc diphosphide | EUH029<br>EUH032       | $\text{Zn}_3\text{P}_2 + 6\text{H}_2\text{O} \rightarrow 2\text{PH}_3 + 3\text{Zn}(\text{OH})_2$ | 0.6                                                         |

\*This is not a complete list of substances with these properties.

Notes:

<sup>1</sup> Rounded to one decimal place

<sup>2</sup> Based on 29.3 g sodium hypochlorite per 100 ml (max solubility)

### Test Methods

There are no direct test methods for HP 12.

Where a test is necessary the test method for emission of flammable gas provided in section 2.12 of /23 - ECHA 2013/ should be used. Where the waste contains EUH031 or EUH032 substances a 1 M hydrochloric acid solution can be used to replace the water in the test.

### 9.13 Determining HP 13: Sensitising

#### Definition and further description of Annex III to WFD

Annex III to WFD (see chapter 11 in this Appendix 5) defines HP 13 'Sensitising' as:  
'waste which contains one or more substances known to cause sensitising effects to the skin or the respiratory organs'

The WFD further explains that:

*'When a waste contains a substance classified as sensitising and is assigned to one of the hazard statement codes H317 or H334 and one individual substance equals or exceeds the concentration limit of 10 %, the waste shall be classified as hazardous by HP 13.'*

Table 24: Hazard Class and Category Code(s) and Hazard statement Code(s) for waste constituents and the corresponding concentration limits for the classification of wastes as hazardous by HP 13 Sensitising

| Hazard Class and Category Code(s) | Hazard statement Code(s) | Description                                                               | Concentration limit (Individual substance) |
|-----------------------------------|--------------------------|---------------------------------------------------------------------------|--------------------------------------------|
| Skin Sens. 1, 1A, and 1B          | H317                     | May cause an allergic skin reaction                                       | $\geq 10 \%$                               |
| Resp. Sens. 1, 1A and 1B          | H334                     | May cause allergy or asthma symptoms or breathing difficulties if inhaled | $\geq 10 \%$                               |

#### Flow chart

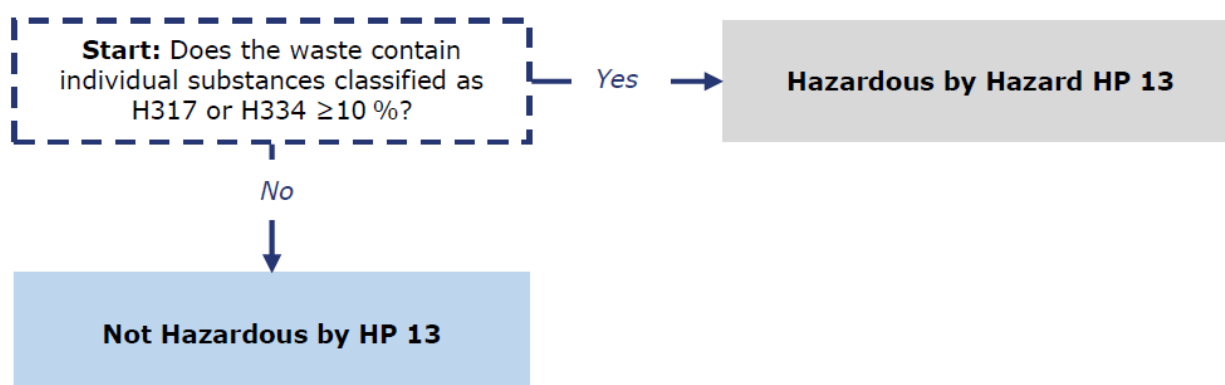


Figure 14: Flow chart for the assessment of HP13 (Adjusted from /37 - UK EA 2015/)



### Test Methods

A HP 13 assessment of a waste is to be made on the basis of the identification of the individual substances in the waste;

- their classification;
- reference to concentration limits

If testing is considered to determining this hazard property, waste containing substances listed in **Error! Reference source not found.** should be assessed for sensitising properties in accordance with the section 3.4 of /23 - ECHA 2013/.

Test methods given in Part B of the Annex to the Test Method Regulation mainly rely on animal testing and thus are not appropriate. Further in-vitro methods may be available from other sources, such as the European Union Reference Laboratory for alternatives to animal testing (<https://eurl-ecvam.jrc.ec.europa.eu>).

#### 9.14 Determining HP 14: Ecotoxic

##### Definition of Annex III to WFD

Annex III of the Waste Framework Directive defines HP 14 'Eco-toxic' as:

*'waste which presents or may present immediate or delayed risks for one or more sectors of the environment'*

HP 14 is not further explained by Annex III to the WFD.

HP 14 describes the eco-toxicological potential or environmental hazards as an intrinsic property of waste, by indicating whether the waste presents or may present immediate or delayed risks for one or more sectors of the environment. At the present time, no guidelines or recommendations on EU level exist for a specific assessment methodology concerning the HP14 property / 14 - BIO 2015]. Therefore the assessment methods for HP 14 currently applied at Omani level needs to be considered, until further amendment of Annex III to the WFS is done for this hazard property as per Recital 7 of Commission Regulation 1357/2014.

According to /14 - BIO 2015/ there is a variety of approaches among EU Member States. In general, currently there are three different strategies regarding the assessment of HP 14:

□

Chemical analysis with the DPD as a reference; ( )DPD= *Directive 1999/45/EC of the European Parliament and of the Council of 31 May 1999 concerning the approximation of the laws, regulations and administrative provisions of the Member States relating to the classification, packaging and labelling of dangerous preparations*

- Bio-testing involving different (acute and chronic) aquatic and terrestrial tests;
- Combination of chemical analysis and bio-testing where bio-testing is applied in case the composition of the waste cannot be sufficiently determined to allow chemical analysis.

## 10. Sampling and chemical analysis of waste

In many cases, sufficient information on the waste in question will be available without a need for sampling, chemical analyses and testing (see chapter **Error! Reference source not found.** for other information sources than sampling and chemical analyses of waste). Where sampling and/or chemical analyses are required, this Chapter will on the one hand present a brief overview on waste sampling.

*If proper Omani standards exists they shall be used, but until then sampling shall be done according to European standards.*

Basic concepts are mentioned. For more details please refer to the presented standards. In addition, this Chapter contains a section with more information and references to specific issues of chemical analyses of waste.

### 10.1 Sampling

Poor sampling is one of the factors that undermine reliable classification of waste. Hence it is strongly recommended that sampling for the purpose of waste classification should be conducted in accordance with the available CEN standards, as they are presented below.

#### 10.1.1. Sampling framework

The European Committee for Standardization (CEN), through its technical committee TC 292 has developed several standards, Technical Reports/Specifications, and state of the art documents for the characterisation of waste. Available documents need to be considered in a coordinated manner. The following list contains relevant standard documents on the 'characterisation of waste – Sampling of waste materials':

- EN 14899

Framework for the preparation and application of a sampling plan;

- CEN/TR 15310-1:2006

Guidance on selection and application of criteria for sampling under various conditions;

- CEN/TR 15310-2:2006

Guidance on sampling techniques;

- CEN/TR 15310-3:2006

Guidance on procedures for sub-sampling in the field;

- CEN/TR 15310-4:2006

Guidance on procedures for sample packaging, storage, preservation, transport and delivery;

- CEN/TR 15310-5:2006

Guidance on the process of defining the sampling plan.



To obtain accurate and representative results, a testing programme needs to be set up before the first sample is taken. This way it is ensured that all necessary factors are considered to enable representative conclusions for the whole waste based on sample(s) /37 - UK EA 2015/. EN 14899 describes this testing programme in detail. In particular seven steps are defined which are displayed in Figure 16.

Alternative sampling procedures are acceptable if they have considered the relevant factors identified in the standards listed above and produce an equally reliable result.

#### 9.14 Determining HP 14: Ecotoxic

##### Definition of Annex III to WFD

Annex III of the Waste Framework Directive defines HP 14 'Eco-toxic' as:

*'waste which presents or may present immediate or delayed risks for one or more sectors of the environment'*

HP 14 is not further explained by Annex III to the WFD.

HP 14 describes the eco-toxicological potential or environmental hazards as an intrinsic property of waste, by indicating whether the waste presents or may present immediate or delayed risks for one or more sectors of the environment. At the present time, no guidelines or recommendations on EU level exist for a specific assessment methodology concerning the HP14 property / 14 - BIO 2015]. Therefore the assessment methods for HP 14 currently applied at Omani level needs to be considered, until further amendment of Annex III to the WFS is done for this hazard property as per Recital 7 of Commission Regulation 1357/2014.

According to /14 - BIO 2015/ there is a variety of approaches among EU Member States. In general, currently there are three different strategies regarding the assessment of HP 14:

□

Chemical analysis with the DPD as a reference; ( )DPD= *Directive 1999/45/EC of the European Parliament and of the Council of 31 May 1999 concerning the approximation of the laws, regulations and administrative provisions of the Member States relating to the classification, packaging and labelling of dangerous preparations*

- Bio-testing involving different (acute and chronic) aquatic and terrestrial tests;
- Combination of chemical analysis and bio-testing where bio-testing is applied in case the composition of the waste cannot be sufficiently determined to allow chemical analysis.

### 9.15 Determining HP 15: Hazardous property not seen by the original waste

#### Definition and further description of Annex III to WFD

Annex III to WFD (see chapter 11 in this Appendix 5) defines HP 15 as:

*'waste capable of exhibiting a hazardous property listed above not directly displayed by the original waste'*

The WFD further explains that:

*'When a waste contains one or more substances assigned to one of the hazard statements or supplemental hazards shown in **Error! Reference source not found.**, the waste shall be classified as hazardous by HP 15, unless the waste is in such a form that it will not under any circumstance exhibit explosive or potentially explosive properties.*

*In addition, Member States may characterise a waste as hazardous by HP 15 based on other applicable criteria, such as an assessment of the leachate.'*

A waste containing substances that are assigned hazard statement or supplemental hazard codes in Table 24 can be tested to show whether it exhibits that hazardous property or not. Alternatively a waste containing those substances can simply be assumed to be hazardous by HP 15.

Oman may characterise a waste as hazardous by HP 15 based on other applicable criteria, such as an assessment of the leachate.

**Table 25:** Hazard statements and supplemental hazards for waste constituents for the classification of wastes as hazardous by HP 15

| Hazard Statement(s) / Supplemental Hazard(s)  |        |
|-----------------------------------------------|--------|
| May mass explode in fire                      | H205   |
| Explosive when dry                            | EUH001 |
| May form explosive peroxides                  | EUH019 |
| Risk of explosion if heated under confinement | EUH044 |

#### Decision Tree

**Error! Reference source not found.** sets out the assessment process for HP 15.

#### Test Methods

Wastes containing substances listed in Table 24 should be assessed or tested for in accordance with /23 - ECHA 2013/. Section 2.1 provides guidance on the classification of mixtures for EUH001, EUH044 and H205.

A waste that would be labelled with a hazard statement or supplementary hazard code as a result assessment for EUH001, EUH019, EUH044 or H205 possesses the hazardous property HP 15.

## Decision Tree

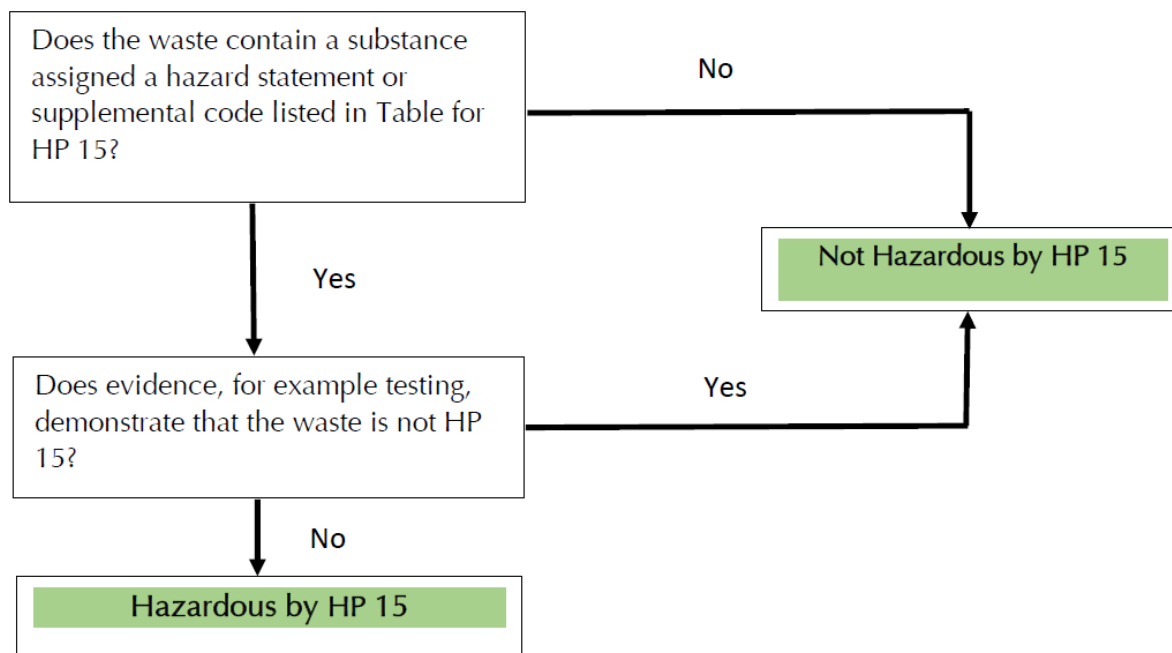


Figure 15: Flow chart for the assessment of HP15 (Adjusted from /37 - UK EA 2015])

## Test Methods

Wastes containing substances listed in **Error! Reference source not found.** should be assessed or tested for in accordance with /23 - ECHA 2013]. Section 2.1 provides guidance on the classification of mixtures for EUH001, EUH044 and H205.

A waste that would be labelled with a hazard statement or supplementary hazard code as a result assessment for EUH001, EUH019, EUH044 or H205 possesses the hazardous property HP 15.

## 11. Sampling and chemical analysis of waste

In many cases, sufficient information on the waste in question will be available without a need for sampling, chemical analyses and testing (see chapter **Error! Reference source not found.** for other information sources than sampling and chemical analyses of waste). Where sampling and/or chemical analyses are required, this Chapter will on the one hand present a brief overview on waste sampling.

*If proper Omani standards exists they shall be used, but until then sampling shall be done according to European standards.*

Basic concepts are mentioned. For more details please refer to the presented standards. In addition, this Chapter contains a section with more information and references to specific issues of chemical analyses of waste.

### 10.1 Sampling

Poor sampling is one of the factors that undermine reliable classification of waste. Hence it is strongly recommended that sampling for the purpose of waste classification should be conducted in accordance with the available CEN standards, as they are presented below.

#### 10.1.1. Sampling framework

The European Committee for Standardization (CEN), through its technical committee TC 292 has developed several standards, Technical Reports/Specifications, and state of the art documents for the characterisation of waste. Available documents need to be considered in a coordinated manner. The following list contains relevant standard documents on the 'characterisation of waste – Sampling of waste materials':

- EN 14899

Framework for the preparation and application of a sampling plan;

- CEN/TR 15310-1:2006

Guidance on selection and application of criteria for sampling under various conditions;

- CEN/TR 15310-2:2006

Guidance on sampling techniques;

- CEN/TR 15310-3:2006

Guidance on procedures for sub-sampling in the field;

- CEN/TR 15310-4:2006

Guidance on procedures for sample packaging, storage, preservation, transport and delivery;

- CEN/TR 15310-5:2006

Guidance on the process of defining the sampling plan.



To obtain accurate and representative results, a testing programme needs to be set up before the first sample is taken. This way it is ensured that all necessary factors are considered to enable representative conclusions for the whole waste based on sample(s) /37 - UK EA 2015/. EN 14899 describes this testing programme in detail. In particular seven steps are defined which are displayed in Figure 16.

Alternative sampling procedures are acceptable if they have considered the relevant factors identified in the standards listed above and produce an equally reliable result.

## 12. Sampling and chemical analysis of waste

In many cases, sufficient information on the waste in question will be available without a need for sampling, chemical analyses and testing (see chapter **Error! Reference source not found.** for other information sources than sampling and chemical analyses of waste). Where sampling and/or chemical analyses are required, this Chapter will on the one hand present a brief overview on waste sampling.

*If proper Omani standards exists they shall be used, but until then sampling shall be done according to European standards.*

Basic concepts are mentioned. For more details please refer to the presented standards. In addition, this Chapter contains a section with more information and references to specific issues of chemical analyses of waste.

### 10.1 Sampling

Poor sampling is one of the factors that undermine reliable classification of waste. Hence it is strongly recommended that sampling for the purpose of waste classification should be conducted in accordance with the available CEN standards, as they are presented below.

#### 10.1.1. Sampling framework

The European Committee for Standardization (CEN), through its technical committee TC 292 has developed several standards, Technical Reports/Specifications, and state of the art documents for the characterisation of waste. Available documents need to be considered in a coordinated manner. The following list contains relevant standard documents on the 'characterisation of waste – Sampling of waste materials':

- EN 14899

Framework for the preparation and application of a sampling plan;

- CEN/TR 15310-1:2006

Guidance on selection and application of criteria for sampling under various conditions;

- CEN/TR 15310-2:2006

Guidance on sampling techniques;

- CEN/TR 15310-3:2006

Guidance on procedures for sub-sampling in the field;

- CEN/TR 15310-4:2006

Guidance on procedures for sample packaging, storage, preservation, transport and delivery;

- CEN/TR 15310-5:2006

Guidance on the process of defining the sampling plan.

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Guidance on sampling techniques;

- CEN/TR 15310-3:2006

Guidance on procedures for sub-sampling in the field;

- CEN/TR 15310-4:2006

Guidance on procedures for sample packaging, storage, preservation, transport and delivery;

- CEN/TR 15310-5:2006

Guidance on the process of defining the sampling plan.

To obtain accurate and representative results, a testing programme needs to be set up before the first sample is taken. This way it is ensured that all necessary factors are considered to enable



representative conclusions for the whole waste based on sample(s) /37 - UK EA 2015/. EN 14899 describes this testing programme in detail. In particular seven steps are defined which are displayed in Figure 16.

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Basic concepts are mentioned. For more details please refer to the presented standards. In addition, this Chapter contains a section with more information and references to specific issues of chemical analyses of waste.

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The European Committee for Standardization (CEN), through its technical committee TC 292 has developed several standards, Technical Reports/Specifications, and state of the art documents for the characterisation of waste. Available documents need to be considered in a coordinated manner. The following list contains relevant standard documents on the 'characterisation of waste – Sampling of waste materials':

- EN 14899

Framework for the preparation and application of a sampling plan;

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Guidance on selection and application of criteria for sampling under various conditions;

- CEN/TR 15310-2:2006

Guidance on sampling techniques;

- CEN/TR 15310-3:2006

Guidance on procedures for sub-sampling in the field;

- CEN/TR 15310-4:2006

Guidance on procedures for sample packaging, storage, preservation, transport and delivery;

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Guidance on the process of defining the sampling plan.

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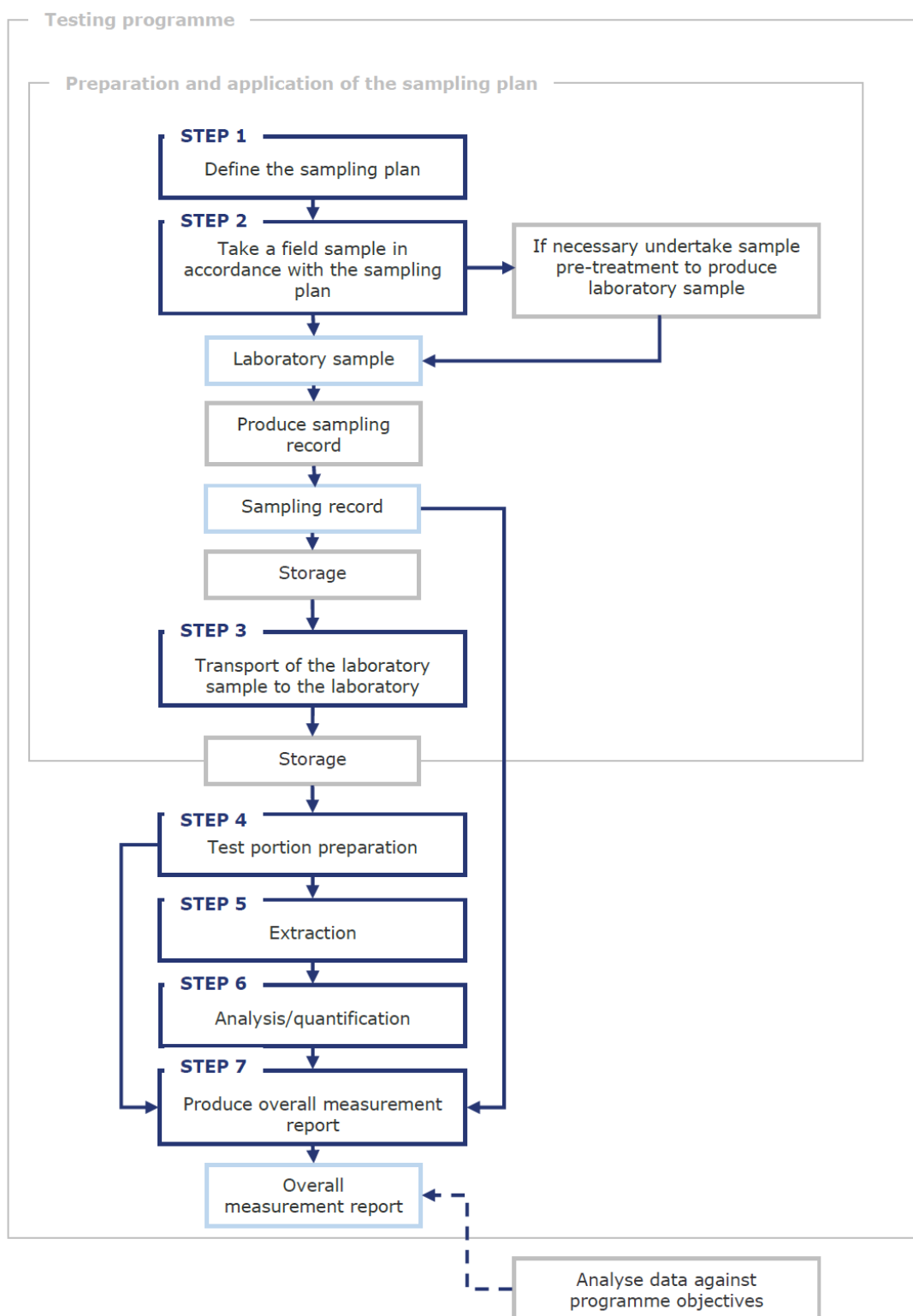


Figure 16: Testing programme adapted from EN 14899:2005

### 10.1.2 Sampling methodology

As Figure 16 covers the whole testing programme according to EN 14899:2005 in general, a more detailed focus shall be drawn on the sampling methodology, which consists of three key elements as displayed in Figure 17:

1. Define the sampling plan
2. Take a field sample in accordance with the sampling plan
3. Transport the laboratory sample to the laboratory

Each key element is divided in further sub-elements one should follow to obtain standardised sampling results.

Especially for defining the sampling plan several steps have to be performed. An informative template for a sampling plan is displayed in Annex A to EN 14899:2005. Figure 17 presents all sub-elements according to EN 14899:2005 and references to the corresponding technical report, where more detailed information can be found. Please note that Figure 17 (key elements including the definition of a sampling plan) has to be considered as a more detailed segment of the overall testing programme as presented in Figure 16.

Also note that EN 15002:2015 gives further guidance on how to prepare test portions from the laboratory sample (see Step 4 in Figure 16 ) which will be the next step after the preparing and applying the sampling methodology as it will be presented in detail in Figure 17).

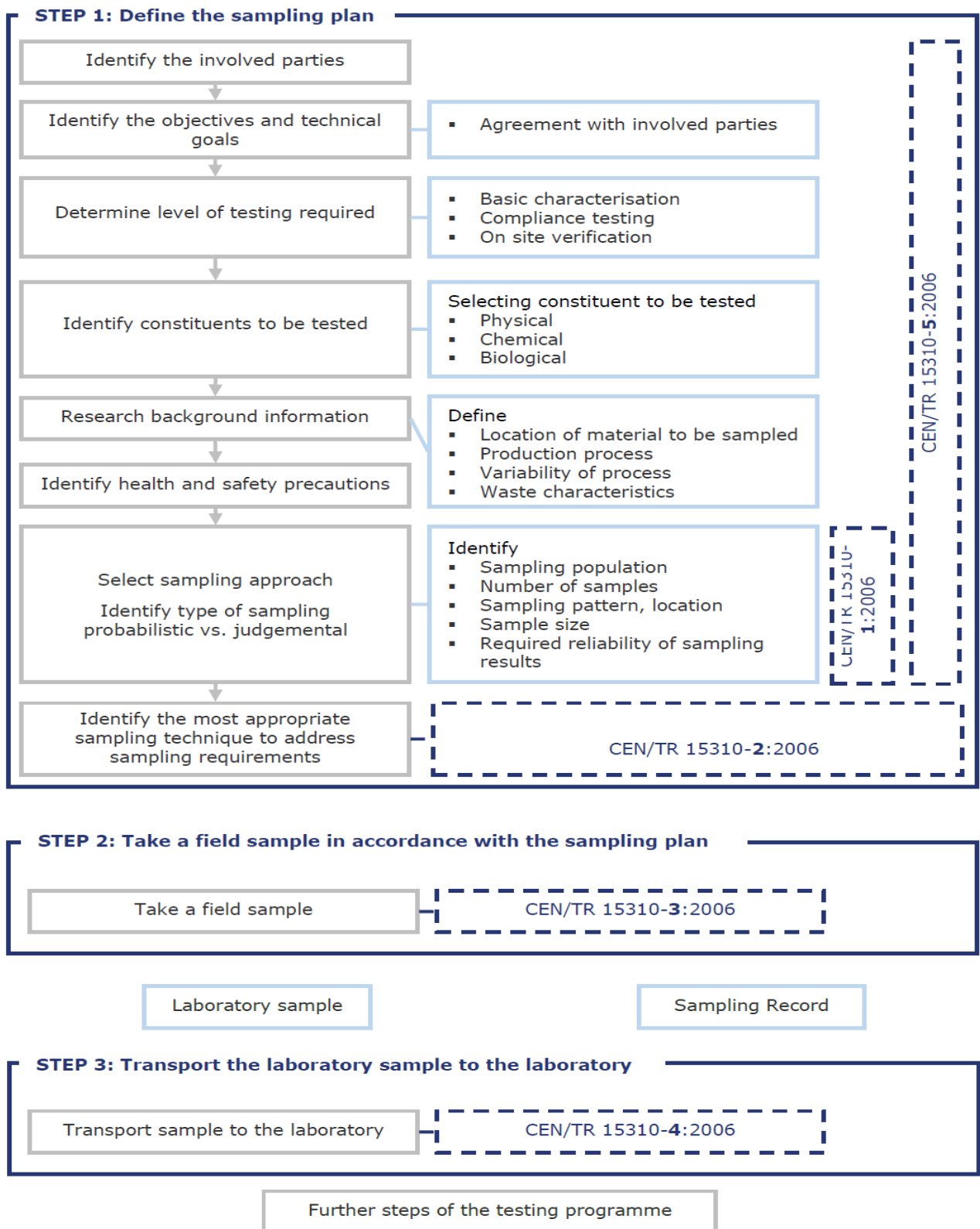


Figure 17: Key elements of sampling methodology according to EN 14899:2005

### 10.1.3 Sampling standards for different waste types

Waste can be present in a large variety of composition and consistency. To ensure reliable results, sampling methods need to be adapted according to the nature of the waste to be sampled. CEN/TR 15310-2:2006 provides detailed information on sampling methods and techniques for different waste types while considering different circumstances. The following materials are referred to:

□

- mobile or viscous liquids
- sludge or paste-like substances
- powders granules and small crystals
- coarse or lumpy solids

For most of these materials CEN/TR 15310-2:2006 refers to the following ways in which the waste may be stored or otherwise be available for sampling:

□

- drums, bags, kegs, blocks, cask or small or flexible walled containers
- vertical uniform or irregular, or horizontal cylindrical tanks
- moving liquids in a pipeline
- lagoons or pits
- hoppers, heaps, stockpiles and silos, falling streams and band or screw conveyors
- massive or large pieces

Complementary, **CEN/TR 15310-3:2006** describes relevant aspects for preparation of sampling and sub-sampling in the field considering different consistencies of the waste in question. Please note that further technical guidance on sampling methods for waste may be available on MS specific level.

### 10.1.4 Sampling strategies to deal with homogeneity/ heterogeneity

A basic condition for reliable results from sampling is that samples are representative for the waste composition. In the case of waste this is often complex since on the one hand pollutants may be distributed non-homogeneously throughout the waste and on the other hand certain wastes additionally show a heterogeneous matrix /32 - LAGA 2012/.

Following EN 14899:2005, heterogeneity is the degree to which one constituent is non-uniformly distributed across the sample population. By contrast, homogeneity can be seen as the degree to which one constituent is uniformly distributed across the sample population. MS specific technical guidelines may exist which provide further information on sampling strategies addressing heterogeneity of waste. /31 - LAGA 2004/ for example provides additional guidelines applied in Germany for examining the waste on its heterogeneity. In particular liquid, pumpable and dusty wastes as well as wastes where homogeneity can be assured via a visual inspection are considered to be homogeneous. Whereas all other wastes are considered to be heterogeneous /31 - LAGA 2004/.

If the heterogeneity of the waste is minimized as far as feasible, CEN/TR 15310-1:2006 and partly also CEN/TR 15310-2:2006 provide a holistic overview on sampling strategies to deal with heterogeneous and homogeneous waste types. It is important to already adapt the sampling plan to the heterogeneity of the waste to be sampled.

#### 10.1.5 Statistical approach of sampling

The overall statistical approach of sampling including statistical basics applied to the special case of waste sampling is provided by CEN/TR 15310-1:2006. An excerpt of presented information within the technical report can be found below:

- Definition of population to be sampled
  - Overall population
  - Sub-population
- Variability
  - Spatial variability
  - Temporal variability
  - Random variability
- □ Different sampling approaches
  - Probabilistic sampling
  - Judgemental sampling
- Sampling patterns
  - Simple random sampling
  - Stratified random sampling
  - Systematic sampling
  - Judgemental sampling
- Sample size
- Frequency of sampling
- Reliability of sampling results
  - Confidence limits

#### 10.2 Chemical analysis of waste

As already indicated in Figure 1 in certain cases the information derived from e.g. a SDS of a product becoming waste, GHS labels, knowledge of the 'waste-generating' process and other databases are not sufficient to allow an assessment of the hazardous properties of the waste in question. As sufficient knowledge on the waste's composition albeit is required to be able to make use of the calculation approach described in chapter 6.5 a chemical analysis of the waste in question may be necessary.

As a general information basis,

Table 26 contains a non-exhaustive list of CEN methods and standards for the characterisation of waste. Apart from CEN methods and standards, [41 - US EPA 2014] provides information on sampling and analysis of solid waste as applied in the US.

Table 26: Non-exhaustive list on CEN methods and standards for the characterisation of waste

| Reference             | Title                                                                                                                                                                                                                                                                                        |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Leaching Tests</b> |                                                                                                                                                                                                                                                                                              |
| CEN/TS 16660:2015     | Characterization of waste. Leaching behaviour test. Determination of the reducing character and the reducing capacity                                                                                                                                                                        |
| EN 15863:2015         | Characterization of waste. Leaching behaviour test for basic characterization. Dynamic monolithic leaching test with periodic leachant renewal, under fixed conditions                                                                                                                       |
| EN 14997:2015         | Characterization of waste. Leaching behaviour test. Influence of pH on leaching with continuous pH control                                                                                                                                                                                   |
| EN 14429:2015         | Characterization of waste. Leaching behaviour test. Influence of pH on leaching with initial acid/base addition                                                                                                                                                                              |
| EN 14429:2015         | Characterization of waste. Leaching behaviour test. Influence of pH on leaching with initial acid/base addition                                                                                                                                                                              |
| EN 14997:2015         | Characterization of waste. Leaching behaviour test. Influence of pH on leaching with continuous pH control                                                                                                                                                                                   |
| CEN/TS 15364:2006     | Characterization of waste. Leaching behaviour tests. Acid and base neutralization capacity test                                                                                                                                                                                              |
| CEN/TS 14405:2004     | Characterization of waste. Leaching behaviour tests. Up-flow percolation test (under specified conditions)                                                                                                                                                                                   |
| EN 12457-1:2002       | Characterisation of waste. Leaching. Compliance test for leaching of granular waste materials and sludges. One stage batch test at a liquid to solid ratio of 2 l/kg for materials with high solid content and with particle size below 4 mm (without or with size reduction)                |
| EN 12457-2:2002       | Characterisation of waste. Leaching. Compliance test for leaching of granular waste materials and sludges. One stage batch test at a liquid to solid ratio of 10 l/kg for materials with particle size below 4 mm (without or with size reduction)                                           |
| EN 12457-3:2002       | Characterisation of waste. Leaching. Compliance test for leaching of granular waste materials and sludges. Two stage batch test at a liquid to solid ratio of 2 l/kg and 8 l/kg for materials with a high solid content and with a particle size below 4 mm (without or with size reduction) |
| EN 12457-4:2002       | Characterisation of waste. Leaching. Compliance test for leaching of granular waste materials and sludges. One stage batch test at a liquid to solid ratio of 10 l/kg for materials with particle size below 10 mm (without or with size reduction)                                          |

| Analyses of Compounds      |                                                                                                                                                                                                 |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EN 16377:2013              | Characterization of waste. Determination of brominated flame retardants (BFR) in solid waste                                                                                                    |
| EN 16192:2011              | Characterization of waste. Analysis of eluates                                                                                                                                                  |
| EN 15216:2007              | Characterization of waste. Determination of total dissolved solids (TDS) in water and eluates                                                                                                   |
| Total Organic Carbon (TOC) |                                                                                                                                                                                                 |
| EN 13137:2001              | Characterisation of waste. Determination of total organic carbon (TOC) in waste, sludges and sediments                                                                                          |
| Digestion                  |                                                                                                                                                                                                 |
| EN 13656:2002              | Characterization of waste. Microwave assisted digestion with hydrofluoric (HF), nitric (HNO <sub>3</sub> ), and hydrochloric (HCl) acid mixture for subsequent determination of elements        |
| EN 13657:2002              | Characterization of waste. Digestion for subsequent determination of aqua regia soluble portion of elements                                                                                     |
| Hydrocarbons C10 to C40    |                                                                                                                                                                                                 |
| EN 14039:2004              | Characterization of waste. Determination of hydrocarbon content in the range of C10 to C40 by gas chromatography                                                                                |
| Dry Matter                 |                                                                                                                                                                                                 |
| EN 14346:2006              | Characterization of waste. Calculation of dry matter by determination of dry residue or water content                                                                                           |
| Inorganic Compounds        |                                                                                                                                                                                                 |
| EN 14582:2007              | Characterization of waste. Halogen and sulfur content. Oxygen combustion in closed systems and determination methods                                                                            |
| EN 15192:2006              | Characterisation of waste and soil. Determination of chromium (VI) in solid material by alkaline digestion and ion chromatography with spectrophotometric detection                             |
| Organic Compounds          |                                                                                                                                                                                                 |
| EN 15308:2008              | Characterization of waste. Determination of selected polychlorinated biphenyls (PCB) in solid waste by using capillary gas chromatography with electron capture or mass spectrometric detection |
| EN 15527:2008              | Characterization of waste. Determination of polycyclic aromatic hydrocarbons (PAH) in waste using gas chromatography mass spectrometry (GC/MS)                                                  |

| Elemental composition |                                                                                                                     |
|-----------------------|---------------------------------------------------------------------------------------------------------------------|
| EN 16424:2014         | Characterization of waste. Screening methods for the element composition by portable X-ray fluorescence instruments |
| EN 15309:2007         | Characterization of waste and soil. Determination of elemental composition by X-ray fluorescence                    |

A method for the exhaustive determination of elements and substances in liquid and solid waste is proposed in “Characterization of waste - Determination of elements and substances in waste” described in the experimental standard AFNOR XP X30-489. It is a Work Item submitted to vote at European level *CEN/TC 292/WG 5 N 735 Determination of content of elements and substances in waste - experimental AFNOR Standard XP X30-489 (CEN/TC 292 N 1430)* for standardisation. More information on this document can be found at /27 - HENNEBERT ET AL. 2013/.

### 10.3 LAC test cannot decide if waste is hazardous or not

Information derived from chemical analyses of waste that can be used for the classification of waste shall be compositional data. As Box 3 underlines, results from leaching tests – as often obtained from laboratory results in the frame of testing the fulfilment of LAC criteria from the Landfill Acceptance Criteria of Oman – cannot be used exclusively for the hazard classification of waste. The only exemption from this principle may be the case of assessing HP 15. In particular, this means that, e.g. if a waste has failed the Inert LAC criteria from the Landfill Acceptance Criteria, it will not be hazardous or respectively non-hazardous automatically. LAC results should not be used exclusively for hazardous waste classification. A LAC analysis is only actually required if:

- 1) The chosen treatment is disposal in landfills and
- 2) The class of landfill previously defined by a hazardous or non-hazardous classification requires a numerical LAC test. However, the substances present in the leachate may offer some clues regarding the constituents of the source waste.

#### Use of WAC laboratory results for waste classification

Input data for waste classification must be compositional data on the waste itself (in the form produced / managed). Results from leaching tests cannot be used directly, except where relevant for assessing HP 15 and potentially, depending on the outcome of on-going debate on the assessment of the ecotoxicity of waste, also for H14. As a consequence, analytical results obtained in the frame of fulfilling Waste Acceptance Criteria (WAC) cannot be used for the classification of the waste as hazardous or non-hazardous, although substances present in the leachate can offer some clues regarding the constituents of the source waste. In particular this means that, e.g. if a waste has failed the Inert WAC criteria from the Landfill Directive, it will not be hazardous automatically. WAC results should not be used for hazardous waste classification. A WAC analysis is only actually required if 1) the chosen treatment is disposal in landfills and 2) the class of landfill previously defined by a hazardous or non-hazardous classification requires a numerical WAC test.

#### Box 3: Use of WAC laboratory results for waste classification

Please note that in particular regarding inorganic substances, chemical analyses usually do not provide information about the specific chemical compounds within a waste but only allow the

identification of cations and anions. Neither the molecular composition nor other consideration, such as the identification of mineralogical forms is usually possible using conventional analytical techniques. In the following, some possible methods to overcome this obstacle are presented.

#### 10.4 Worst case substances

In the likely case that the waste holder has some knowledge on the elements but not on the substances present in the waste, it is suggested to use the concept of determining 'reasonable worst case' substances for each identified element. These worst case substances should be determined for each hazardous property and in the following should be used for the assessment of hazardous properties.

Worst case substances should be determined taking into consideration which substances reasonably could exist in the waste. The term reasonable is explained by /37 - UK EA 2015/ that "*reasonable indicates that substances cannot exist within the waste because, for example, of their physical and chemical properties can be excluded*". A similar explanation is used by /17 - BMU 2005/. /28 - INERIS 2015/ contains a collection of 'realistic worst case' substances by elements for each hazardous properties, which can serve as general information basis.

#### 10.5 Generic entries

No further speciation on identified elements is needed for elements having a 'generic entry' in the list of harmonised classifications in Table 3.1 of Part 3 of Annex VI to the CLP Regulation/1/.

However, the notes relating to the classification and labelling of mixtures presented in chapter 1.1.3.2 of Annex VI to the CLP Regulation /1/ may be taken into account when establishing the hazardous properties of wastes based on 'generic entries'. These entries are presented in Table 27.

Table 27: Generic entries of elements (11) in the CLP Regulation /28 - INERIS 2015/

| Element       | Index No     | International Chemical Identification                                                                                                                                                                                                                                   | Hazard Class and Category Code(s)                                                                                                            | Hazard Statement Code(s)                                                 |
|---------------|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| <b>As</b>     | 033-002-00-5 | <b>arsenic</b> compounds, with the exception of those specified elsewhere in this Annex                                                                                                                                                                                 | Acute Tox. 3 *<br>Acute Tox. 3 *<br>Aquatic Acute 1<br>Aquatic Chronic 1                                                                     | H331<br>H301<br>H400<br>H410                                             |
| <b>Ba</b>     | 056-002-00-7 | <b>barium</b> salts, with the exception of barium sulphate, salts of 1-azo-2-hydroxynaphthalenyl aryl sulphonic acid, and of salts specified elsewhere in this Annex                                                                                                    | Acute Tox. 4 *<br>Acute Tox. 4 *                                                                                                             | H332<br>H302                                                             |
| <b>Be</b>     | 004-002-00-2 | <b>beryllium</b> compounds with the exception of aluminium beryllium silicates, and with those specified elsewhere in this Annex                                                                                                                                        | Carc. 1B<br>Acute Tox. 2 *<br>Acute Tox. 3 *<br>STOT RE 1<br>Eye Irrit. 2<br>STOT SE 3<br>Skin Irrit. 2<br>Skin Sens. 1<br>Aquatic Chronic 2 | H350i<br>H330<br>H301<br>H372 **<br>H319<br>H335<br>H315<br>H317<br>H411 |
| <b>Cd</b>     | 048-001-00-5 | <b>cadmium</b> compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex | Acute Tox. 4 *<br>Acute Tox. 4 *<br>Acute Tox. 4 *<br>Aquatic Acute 1<br>Aquatic Chronic 1                                                   | H332<br>H312<br>H302<br>H400<br>H410                                     |
| <b>Cr(VI)</b> | 024-017-00-8 | <b>chromium (VI)</b> compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex                                                                                                                                                | Carc. 1B<br>Skin Sens. 1<br>Aquatic Acute 1<br>Aquatic Chronic 1                                                                             | H350i<br>H317<br>H400<br>H410                                            |
| <b>Hg</b>     | 080-002-00-6 | inorganic compounds of <b>mercury</b> with the exception of mercuric sulphide and those specified elsewhere in this Annex                                                                                                                                               | Acute Tox. 2 *<br>Acute Tox. 1<br>Acute Tox. 2 *<br>STOT RE 2 *<br>Aquatic Acute 1<br>Aquatic Chronic 1                                      | H330<br>H310<br>H300<br>H373 **<br>H400<br>H410                          |
| <b>Pb</b>     | 082-001-00-6 | <b>lead</b> compounds with the exception of those specified elsewhere in this Annex                                                                                                                                                                                     | Repr. 1A<br>Acute Tox. 4 *<br>Acute Tox. 4 *<br>STOT RE 2 *<br>Aquatic Acute 1<br>Aquatic Chronic 1                                          | H360Df<br>H332<br>H302<br>H373 **<br>H400<br>H410                        |

| Element   | Index No     | International Chemical Identification                                                                                                                                                                     | Hazard Class and Category Code(s)                                                     | Hazard Statement Code(s)               |
|-----------|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>Sb</b> | 051-003-00-9 | <b>antimony</b> compounds, with the exception of the tetroxide ( $Sb_2O_4$ ), pentoxide ( $Sb_2O_5$ ), trisulphide ( $Sb_2S_3$ ), pentasulphide ( $Sb_2S_5$ ) and those specified elsewhere in this Annex | Acute Tox. 4 *<br>Acute Tox. 4 *<br>Aquatic Chronic 2                                 | H332<br>H302<br>H411                   |
| <b>Se</b> | 034-002-00-8 | <b>selenium</b> compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex                                                                                        | Acute Tox. 3 *<br>Acute Tox. 3 *<br>STOT RE 2<br>Aquatic Acute 1<br>Aquatic Chronic 1 | H331<br>H301<br>H373**<br>H400<br>H410 |
| <b>Tl</b> | 081-002-00-9 | <b>thallium</b> compounds, with the exception of those specified elsewhere in this Annex                                                                                                                  | Acute Tox. 2 *<br>Acute Tox. 2 *<br>STOT RE 2 *<br>Aquatic Chronic 2                  | H330<br>H300<br>H373 **<br>H411        |
| <b>U</b>  | 092-002-00-3 | <b>uranium</b> compounds with the exception of those specified elsewhere in this Annex                                                                                                                    | Acute Tox. 2 *<br>Acute Tox. 2 *<br>STOT RE 2<br>Aquatic Chronic 2                    | H330<br>H300<br>H373**<br>H411         |

## 15. Annex III to WFD (Waste Frame Directive in EU)

COMMISSION REGULATION (EU) No 1357/2014 of 18 December 2014 replacing Annex III to Directive 2008/98/EC of the European Parliament and of the Council on waste and repealing certain Directives

### ANNEX III PROPERTIES OF WASTE WHICH RENDER IT HAZARDOUS

**HP 1 “Explosive:”** waste which is capable by chemical reaction of producing gas at such a temperature and pressure and at such a speed as to cause damage to the surroundings. Pyrotechnic waste, explosive organic peroxide waste and explosive self-reactive waste is included. When a waste contains one or more substances classified by one of the hazard class and category codes and hazard statement codes shown in Table 1, the waste shall be assessed for HP 1, where appropriate and proportionate, according to test methods. If the presence of a substance, a mixture or an article indicates that the waste is explosive, it shall be classified as hazardous by HP 1.

Table 1: Hazard Class and Category Code(s) and Hazard statement Code(s) for waste constituents for the classification of wastes as hazardous by HP 1

| Hazard Class and Category Code(s) | Hazard statement Code(s) |
|-----------------------------------|--------------------------|
| Unst. Expl.                       | H 200                    |
| Expl. 1.1                         | H 201                    |
| Expl. 1.2                         | H 202                    |
| Expl. 1.3                         | H 203                    |
| Expl. 1.4                         | H 204                    |
| Self-react. A                     | H 240                    |
| Org. Perox. A                     |                          |
| Self-react. B                     | H 241                    |
| Org. Perox. B                     |                          |

**HP 2“Oxidising:”**waste which may, generally by providing oxygen, cause or contribute to the combustion of other materials. When a waste contains one or more substances classified by one of the hazard class and category codes and hazard statement codes shown in Table 2, the waste shall be assessed for HP 2, where appropriate and proportionate, according to test methods. If the presence of a substance indicates that the waste is oxidising, it shall be classified as hazardous by HP 2.

*Table 2: Hazard Class and Category Code(s) and Hazard statement Code(s) for the classification of wastes as hazardous by HP 2*

| Hazard Class and Category Code(s) | Hazard statement Code(s) |
|-----------------------------------|--------------------------|
| Ox. Gas 1                         | H 270                    |
| Ox. Liq. 1                        | H 271                    |
| Ox. Sol. 1                        |                          |
| Ox. Liq. 2, Ox. Liq. 3            | H 272                    |
| Ox. Sol. 2, Ox. Sol. 3            |                          |

### HP 3 “Flammable:” —

- flammable liquid waste: liquid waste having a flash point below 60 °C or waste gas oil, diesel and light heating oils having a flash point > 55 °C and ≤ 75 °C;
- flammable pyrophoric liquid and solid waste: solid or liquid waste which, even in small quantities, is liable to ignite within five minutes after coming into contact with air;
- flammable solid waste: solid waste which is readily combustible or may cause or contribute to fire through friction;
- flammable gaseous waste: gaseous waste which is flammable in air at 20 °C and a standard pressure of 101.3 kPa;
- water reactive waste: waste which, in contact with water, emits flammable gases in dangerous quantities;
- other flammable waste: flammable aerosols, flammable self-heating waste, flammable organic peroxides and flammable self-reactive waste. When a waste contains one or more substances classified by one of the following hazard class and category codes and hazard statement codes shown in Table 3, the waste shall be assessed, where appropriate and proportionate, according to test methods. If the presence of a substance indicates that the waste is flammable, it shall be classified as hazardous by HP 3.

*Table 3: Hazard Class and Category Code(s) and Hazard statement Code(s) for waste constituents for the classification of wastes as hazardous by HP 3:*

| Hazard Class and Category Code(s) | Hazard statement Code(s) |
|-----------------------------------|--------------------------|
| Flam. Gas 1                       | H220                     |
| Flam. Gas 2                       | H221                     |
| Aerosol 1                         | H222                     |
| Aerosol 2                         | H223                     |
| Flam. Liq. 1                      | H224                     |
| Flam. Liq.2                       | H225                     |
| Flam. Liq. 3                      | H226                     |
| Flam. Sol. 1                      | H228                     |
| Flam. Sol. 2                      |                          |

| Hazard Class and Category Code(s) | Hazard statement Code(s) |
|-----------------------------------|--------------------------|
| Self-react. CD                    | H242                     |
| Self-react. EF                    |                          |
| Org. Perox. CD                    |                          |
| Org. Perox. EF                    |                          |
| Pyr. Liq. 1                       | H250                     |
| Pyr. Sol. 1                       |                          |
| Self-heat.1                       | H251                     |
| Self-heat. 2                      | H252                     |
| Water-react. 1                    | H260                     |
| Water-react. 2<br>Water-react. 3  | H261                     |

#### HP 4“Irritant”

- **skin irritation and eye damage:** waste which on application can cause skin irritation or damage to the eye. When a waste contains one or more substances in concentrations above the concentration limit value, that are classified by one of the following hazard class and category codes and hazard statement codes and one or more of the following concentration limits is exceeded or equalled, the waste shall be classified as hazardous by HP 4.

The cut-off value for consideration in an assessment for Skin corr. 1A (H314), Skin irrit. 2 (H315), Eye dam. 1 (H318) and Eye irrit. 2 (H319) is 1 %. If the sum of the concentrations of all substances classified as Skin corr. 1A (H314) exceeds or equals 1 %, the waste shall be classified as hazardous according to HP 4. If the sum of the concentrations of all substances classified as H318 exceeds or equals 10 %, the waste shall be classified as hazardous according to HP 4. If the sum of the concentrations of all substances classified H315 and H319 exceeds or equals 20 %, the waste shall be classified as hazardous according to HP 4. Note that wastes containing substances classified as H314 (Skin corr.1A, 1B or 1C) in amounts greater than or equal to 5 % will be classified as hazardous by HP 8. HP 4 will not apply if the waste is classified as HP 8.

#### HP 5“Specific Target Organ Toxicity (STOT)/Aspiration Toxicity:”

- Waste which can cause specific target organ toxicity either from a single or repeated exposure, or which cause acute toxic effects following aspiration. When a waste contains one or more substances classified by one or more of the following hazard class and category codes and hazard statement codes shown in Table 4, and one or more of the concentration limits in Table 4 is exceeded or equalled, the waste shall be classified as hazardous according to HP 5. When substances classified as STOT are present in a waste, an individual substance has to be present at or above the concentration limit for the waste to be classified as hazardous by HP 5. When a waste contains one or more substances classified as Asp. Tox. 1 and the sum of those substances exceeds or equals the concentration limit, the waste shall be classified as hazardous by HP 5 only where the overall kinematic viscosity (at 40 °C) does not exceed 20.5 mm<sup>2</sup>/s. (1) 19.12.2014 L 365/93 Official Journal of the European Union EN (1) The kinematic viscosity shall only be determined for fluids.

*Table 4: Hazard Class and Category Code(s) and Hazard statement Code(s) for waste constituents and the corresponding concentration limits for the classification of wastes as hazardous by HP 5*

| Hazard Class and Category Code(s) | Hazard statement Code(s) | Concentration limit |
|-----------------------------------|--------------------------|---------------------|
| STOT SE 1                         | H370                     | 1 %                 |
| STOT SE 2                         | H371                     | 10 %                |
| STOT SE 3                         | H335                     | 20 %                |
| STOT RE 1                         | H372                     | 1 %                 |
| STOT RE 2                         | H373                     | 10 %                |
| Asp. Tox. 1                       | H304                     | 10 %                |

#### HP 6“Acute Toxicity:”

- Waste which can cause acute toxic effects following oral or dermal administration, or inhalation exposure. If the sum of the concentrations of all substances contained in a waste, classified with an acute toxic hazard class and category code and hazard statement code given in Table 5, exceeds or equals the threshold given in that table, the waste shall be classified as hazardous by HP 6. When more than one substance classified as acute toxic is present in a waste, the sum of the concentrations is required only for substances within the same hazard category. The following cut-off values shall apply for consideration in an assessment: — For Acute Tox. 1, 2 or 3 (H300, H310, H330, H301, H311, H331): 0.1 %; — For Acute Tox. 4 (H302, H312, H332): 1 %.

Table 5: Hazard Class and Category Code(s) and Hazard statement Code(s) for waste constituents and the corresponding concentration limits for the classification of wastes as hazardous by HP 6

| Hazard Class and Category Code(s) | Hazard statement Code(s) | Concentration limit |
|-----------------------------------|--------------------------|---------------------|
| Acute Tox.1 (Oral)                | H300                     | 0,1 %               |
| Acute Tox. 2 (Oral)               | H300                     | 0,25 %              |
| Acute Tox. 3 (Oral)               | H301                     | 5 %                 |
| Acute Tox 4 (Oral)                | H302                     | 25 %                |
| Acute Tox.1 (Dermal)              | H310                     | 0,25 %              |
| Acute Tox.2 (Dermal)              | H310                     | 2,5 %               |
| Acute Tox. 3 (Dermal)             | H311                     | 15 %                |
| Acute Tox 4 (Dermal)              | H312                     | 55 %                |
| Acute Tox 1 (Inhal.)              | H330                     | 0,1 %               |
| Acute Tox.2 (Inhal.)              | H330                     | 0,5 %               |
| Acute Tox. 3 (Inhal.)             | H331                     | 3,5 %               |
| Acute Tox. 4 (Inhal.)             | H332                     | 22,5 %              |

#### HP 7“Carcinogenic:”

- Waste which induces cancer or increases its incidence. When a waste contains a substance classified by one of the following hazard class and category codes and hazard statement codes and exceeds or equals one of the following concentration limits shown in Table 6, the waste shall be classified as hazardous by HP 7. When more than one substance classified as carcinogenic is present in a waste, an individual substance has to be present at or above the concentration limit for the waste to be classified as hazardous by HP 7. 19.12.2014 L 365/94 Official Journal of the European Union EN

Table 6: Hazard Class and Category Code(s) and Hazard statement Code(s) for waste constituents and the corresponding concentration limits for the classification of wastes as hazardous by HP 7

| Hazard Class and Category Code(s) | Hazard statement Code(s) | Concentration limit |
|-----------------------------------|--------------------------|---------------------|
| Carc. 1A                          | H350                     | 0,1 %               |
| Carc. 1B                          |                          |                     |
| Carc. 2                           | H351                     | 1,0 %               |

#### HP 8“Corrosive:”

- Waste which on application can cause skin corrosion. When a waste contains one or more substances classified as Skin corr.1A, 1B or 1C (H314) and the sum of their concentrations exceeds or equals 5 %, the waste shall be classified as hazardous by HP 8. The cut-off value for consideration in an assessment for Skin corr. 1A, 1B, 1C (H314) is 1.0 %.

#### HP 9“Infectious:”

- Waste containing viable micro-organisms or their toxins which are known or reliably believed to cause disease in man or other living organisms. The attribution of HP 9 shall be assessed by the rules laid down in reference documents or legislation in the Member States.

#### HP 10“Toxic for reproduction:”

- Waste which has adverse effects on sexual function and fertility in adult males and females, as well as developmental toxicity in the offspring. When a waste contains a substance classified by one of the following hazard class and category codes and hazard statement codes and exceeds or equals one of the following concentration limits shown in Table 7, the waste shall be classified hazardous according to HP 10. When more than one substance classified as toxic for reproduction is present in a waste, an individual substance has to be present at or above the concentration limit for the waste to be classified as hazardous by HP 10.

Table 7: Hazard Class and Category Code(s) and Hazard statement Code(s) for waste constituents and the corresponding concentration limits for the classification of wastes as hazardous by HP 10

| Hazard Class and Category Code(s) | Hazard statement Code(s) | Concentration limit |
|-----------------------------------|--------------------------|---------------------|
| Repr. 1A                          | H360                     | 0,3 %               |
| Repr. 1B                          |                          |                     |
| Repr. 2                           | H361                     | 3,0 %               |

#### HP 11“Mutagenic:”

- Waste which may cause a mutation that is a permanent change in the amount or structure of the genetic material in a cell. When a waste contains a substance classified by one of the following hazard class and category codes and hazard statement codes and exceeds or equals one of the following concentration limits shown in Table 8, the waste shall be classified as hazardous according to HP 11. When more than one substance classified as mutagenic is present in a waste, an individual substance has to be present at or above the concentration limit for the waste to be classified as hazardous by HP 11. 19.12.2014 L 365/95 Official Journal of the European Union EN

Table 8: Hazard Class and Category Code(s) and Hazard statement Code(s) for waste constituents and the corresponding concentration limits for the classification of wastes as hazardous by HP 11

| Hazard Class and Category Code(s) | Hazard statement Code(s) | Concentration limit |
|-----------------------------------|--------------------------|---------------------|
| Muta. 1A,                         | H340                     | 0,1 %               |
| Muta. 1B                          |                          |                     |
| Muta. 2                           | H341                     | 1,0 %               |

#### HP 12“Release of an acute toxic gas:”

- Waste which releases acute toxic gases (Acute Tox. 1, 2 or 3) in contact with water or an acid. When a waste contains a substance assigned to one of the following supplemental hazards EUH029, EUH031 and EUH032, it shall be classified as hazardous by HP 12 according to test methods or guidelines.

#### HP 13“Sensitising:”

- Waste which contains one or more substances known to cause sensitising effects to the skin or the respiratory organs. When a waste contains a substance classified as sensitising and is assigned to one of the hazard statement codes H317 or H334 and one individual substance equals or exceeds the concentration limit of 10 %, the waste shall be classified as hazardous by HP 13.

#### HP 14“Ecotoxic:”

- Waste which presents or may present immediate or delayed risks for one or more sectors of the environment.

#### HP 15“Waste capable of exhibiting a hazardous property listed above not directly displayed by the original waste”.

- When a waste contains one or more substances assigned to one of the hazard statements or supplemental hazards shown in Table 9, the waste shall be classified as hazardous by HP 15, unless the waste is in such a form that it will not under any circumstance exhibit explosive or potentially explosive properties.

Table 9: Hazard statements and supplemental hazards for waste constituents for the classification of wastes as hazardous by HP 15

| Hazard Statement(s)/Supplemental Hazard(s)    |        |
|-----------------------------------------------|--------|
| May mass explode in fire                      | H205   |
| Explosive when dry                            | EUH001 |
| May form explosive peroxides                  | EUH019 |
| Risk of explosion if heated under confinement | EUH044 |

In addition, Member States may characterise a waste as hazardous by HP 15 based on other applicable criteria, such as an assessment of the leachate. *Note* Attribution of the hazardous property HP 14 is made on the basis of the criteria laid down in Annex VI to Council Directive 67/548/EEC. *Test methods:* The methods to be used are described in Council Regulation (EC) No 440/2008 (1) and in other relevant CEN notes or other internationally recognised test methods and guidelines.’  
19.12.2014 L 365/96 Official Journal of the European Union EN.

(1)Council Regulation (EC) No 440/2008 of 30 May 2008 laying down test methods pursuant to Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) (OJ L 142, 31.5.2008, p. 1).