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Possible Implications of CLP- criteria on the European Waste List - entries

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General problems HP4-HP8



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CaO in waste → no harmonised classification in the EU in Annex VI of CLP for this substance

H315 Causes skin irritation (cat 2), H318 causes serious eye damage (cat 1)

Other literature: H314 causes severe skin burns and eye damage (cat 1)

CaO + H₂O → formation of Ca(OH)₂ → classified as H315 and H318

EU Landfill Decision - Landfill ban on corrosive wastes

“H315, H318 or H319 not considered corrosive in the conditions of landfill” ?

Ca(OH)₂ reaction with CO₂ from air – carbonation („ageing“, “weathering”) → no environmental problems, protection of humans through workers place safety regulations!

Construction and demolition waste



new concrete : pH 12 - 13 due to Ca(OH)_2

Concrete surface reacts with CO_2 in air, pH of the surface is reduced to **about 8.0** through a process called **carbonation**.

Very old C&D waste, no free Ca(OH)_2 - no alkaline reaction

Cement (Cr VI) – HP13 sensitizing (reducing agents added to cement (Cr VI < 2ppm) - limited storage time of cement!)

Some mixed mineral demolition waste – pH up to 12 (AT-EPA)- maybe due to residual Ca(OH)_2 ?

Stone dusts : Respirable Crystalline Silica - silicosis : classification STOT RE Cat 1 if conc. $\geq 10\%$, **STOT RE 2**, if conc. $1\% - < 10\%$, fraction $\leq 10 \mu\text{m}$

Cement – solidification of waste



If cement were used for solidification of hazardous waste, the stabilised/solidified wastes (EWC 19 03) would stay hazardous due to the characteristics of cement!

Lack of sufficient landfills for hazardous waste in Europe!

Risk based approach should apply – duly solidified wastes may be landfilled like non-hazardous wastes !

Manufacture of ceramics, bricks, cement, lime



manufacture of ceramic goods, bricks, tiles, construction products

- 10 12 03* particulates and dust
- 10 12 05* sludges and filter cakes from gas treatment
- 10 12 13* sludge from on-site effluent treatment

→ **Would become hazardous due to CaO /Ca(OH)₂ content**

manufacture of cement, lime, plaster, articles made from them

- 10 13 04* wastes from calcination and hydration of lime
- 10 13 07* sludges and filter cakes from gas treatment
- 10 13 14* waste concrete and concrete sludge

→ **Would become hazardous due to CaO/Ca(OH)₂ content**

Ashes from combustion plants (EWC 10)



Black coal fly ash: SiO₂ 40-55%, Al₂O₃-23-35%, Fe₂O₃-4-17% CaO 1-8%, MgO 0,8-4,8%

Brown coal fly ash: free CaO 2-25% (total 2-50%) - pH 10 - 12

Ash from (untreated) biomass incineration – high contents of chlorides & alkalines, 20-35 % CaO - no additive for cement, use as fertilizer / for composting, but hazardous waste prohibited!

Hazardous mirror entries would be needed due to CaO and salt loads – HP4, HP8, HP14

10 01 XX* bottom ash, slag and boiler dust (excluding boiler dust mentioned from oil firing) - 10 01 XX* coal fly ash

Iron and steel industry



10 02 01* wastes from the processing of slag

10 02 02* unprocessed slag

→ would become hazardous due to CaO → Ca(OH)₂ - HP4, HP8, HP14

LD Slag (converter slag; steelmaking) (Literature: Dr Andreas Larm – Lower Saxony): SiO₂ 18%, Al₂O₃ 2,0%, MgO 2,5-6%, P₂O₅ 1,5-2,7%, Cr₂O₃ 0,3-0,5%, S 0,1-0,2%, Fe 18-22%, MgO 4,2-6% **CaO 49% mean value, max. 53%, CaO free 6% - 9,5% → pH 12,1-12,7**

EAF Slag (steel process; secondary steelmaking)

SiO₂ 13-18,5%, Al₂O₃ 6-9,5%, MgO 5-7,5%, P₂O₅ 0,6-1%, Cr₂O₃ 2-3%, S 0,2-0,4%, Fe 18-22%, MgO 6,1-9,8% **CaO 26% mean value, max. 36%, CaO free 0,4% mean value, max 0,8% → pH 11,6-12,3**

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Non-ferrous metal industry



01 03 XX* Red mud from alumina production

Mirror entry for hazardous waste necessary, if corrosive or sensitizing substances and pH > 11,5 or HP14 ecotoxic

Red mud is a solid waste from refining bauxite to provide alumina; mixture of solid and metallic oxide-bearing impurities. The mud is highly basic with a pH 10 to 13.

Criteria → HP8, HP4, HP14; if Chromium VI present → maybe HP13 sensitizing

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Non-ferrous and ferrous metallurgy



Other non-ferrous thermal metallurgy

10 08 XX* particulates and dust - **hazardous mirror entry needed** (e.g. Ni dust/ Ni oxide, Be dust, Sb oxides....)

10 08 XX* other slags → **hazardous mirror entry needed**

Wastes from metal casting - hazardous mirror entries needed, if content of As, Pb, Ni.... triggers a haz. prop. (at least H14)

10 09 XX* furnace slag (casting of ferrous pieces)

10 10 XX* furnace slag (casting of non-ferr. pieces)

Thermal zinc metallurgy

11 05 02* Zinc ash → **ZnO H410 aquatoxic – HP14 !**

Salt wastes - Sulfur wastes



Change of wording necessary, as not only heavy metal salts exhibit hazardous characteristics !

06 03 13* solid salts and solutions containing heavy metals **or exhibiting hazardous properties**

Consider: $\text{Ca}(\text{OH})_2$, NaOH,and „semimetals“ like As, Se ... Be.

Harmonised definition of „heavy metal“ in the EWL necessary- normally metals with a density > 3,5 to 5.

Mirror entry needed:

05 07 XX* wastes containing sulphur and showing hazardous property → **sulfur classified as skin irritant H315**

Leather industry



Mirror entries for hazardous waste required:

04 01 XX* tanning liquor containing chromium

In the EU no Cr- VI-tanning is used - Cr-III or Al salts; pickling of the hides (NaCl , NaSO4 ..), fixation by addition of alkalines; impurities of Cr (III) → might become Cr(VI)

Due to salt loads - at least HP14 or maybe HP13 (Cr VI)

04 01 XX* tanning liquor free of chromium

use of aldehydes (glutaraldehyde: toxic – corrosive – ecotoxic)

Due to salt loads or content of aldehydes - at least HP14

Food industry



02 03 XX* hazardous wastes from preserving agents

02 06 XX* hazardous wastes from preserving agents

HAZARDOUS mirror entries necessary: Food preserving agents are chemical wastes, which in concentrated form are classified as hazardous: benzoic acid, sodium benzoate, sulfite compounds, biphenyl, thiabendazole ...

02 03 XX * hazardous wastes from solvent extraction

02 07 XX* hazardous wastes from chemical treatment

HAZARDOUS mirror entries necessary, residueal solvents+chemical compounds might trigger at least HP14

ALTERNATIVE: Clear reference to use entries in Chapter 16 03 !

Batteries



Normally all batteries should be hazardous waste (e.g. Ni-Me-Hydride – electrolytes KOH; lithium batteries)
16 06 04* alkaline batteries
16 06 05* other batteries and accumulators

Possible hazards: HP4, HP6, HP8, HP14 (HP15 – depending on definition)

Especially Li-based battery systems and Ni-MeH batteries are very likely to catch fire, if the sealing is damaged (e.g. Ni-NiH-batteries - formation of explosive H₂, Li-systems: self-ignition)

Maybe catch-all position for any non-hazardous battery system in the future!

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HP15 - waste capable by any means, after disposal, of yielding another substance, e.g. a leachate, which possesses any of the characteristics listed above"



AT: proposal – Leachate test on the basis of the Landfill Decision, Table 2.2.2 – objections by many EU-Member States

Proposal for NEW DEFINITION:

Waste capable of exhibiting a hazardous property listed above (during storage or treatment) not directly displayed by the original waste

EUH001: Explosive when dry

EUH018: In use may form flammable/explosive vapour-air mixture

EUH019: May form explosive peroxides

EUH044: Risk of explosion if heated under confinement

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Criterion HP15 - problems



New definition: „**during treatment**“ may also cover shredding, composting or incineration (→ **exhaust gas** excluded from new definition? What about **methane from biological processes** (CH₄-air mixture: explosive)? It is a climate relevant gas!

Export to 3rd States - HP15 referring to leachate is a criterion in the Basel Convention and OECD! Is HP14-testing accepted as alternative to HP15 by Third States?

Gas release in contact with water or acid is covered by HP12 and emission of flammable gases in contact with water by HP3.

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HP14- HP15 problems



Introduce a „Conventional Approach“: no testing of wastes, which per definition are „non-hazardous“ in the EWL, unless waste is infectious or contaminated with hazardous substances/ waste.

Otherwise **agricultural wastes** (manure, animal faeces, off-spec. compost) and **household waste** – **HP14 ecotoxic !**

Wastes containing **salts** or salt wastes (NaCl..), even if necessary pH-neutralisation took place → **HP14 ecotoxic** – Testing with **specific salt resistant test organisms** ?

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Contamination of wastes with mineral oil



EU-End of Waste Regulation for metal scrap or Green List classification: no hazardous property must be met !

What is the tolerated contamination with hydrocarbons (e.g. mineral oil), which does not trigger a HP criterion?

Harmonized approach in the EU would be necessary!

Worst case scenario: mineral oils contain carcinogenic substances - therefore only 0,1% allowed – This limit cannot be met in reality!

Presently in AT: 2% (total content of hydrocarbons (index) laid down in HP15), in DE: 0,8%, in BG: 1%

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Thank you for your attention !



Registered substances ECHA:

apps.echa.europa.eu/registered/registered-sub.aspx

CLP-Regulation

ec.europa.eu/enterprise/sectors/chemicals/documents/classification/#h2-1

Characterization of ferrous metal slags – Dr. Andreas Larm

www.titro.de/phstarti/larmbew/fehs_1_4.htm

Oekopol report 2008

ec.europa.eu/environment/waste/pdf/low_review_oekopol.pdf

CLP and construction materials

www.baustoffindustrie.de/root/img/pool/downloads/clp-leitfaden-bbs.pdf

www.euroquarz.de/service-und-downloads/umgang-quarzsand-quarzkies/quarzfeinstaub/

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