

## HP4 and HP8 – Difficulties in applying the pH-limits from the CLP-Regulation

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### Content of presentation

- ✓ to discuss the relevance of pH in the waste management chain
- ✓ to address specific features of alkaline waste
- ✓ to give examples of critical waste streams regarding to HP4/HP8

Special focus on alkaline waste!

## Use of pH if a waste contains a water phase

- The pH of the liquid phase is a generic property
- It can be easily measured and evaluated
- ISO 10523:2008 specifies a method for the determination of the pH value in water within the range pH 2 to pH 12
- Information can be used for the evaluation of risks in all stages of waste handling



## Use of pH if a waste contains NO free water

- The pH of the waste is a risk based approach (relevance of pH without a use scenario is meaningless)
- Numerous test methods have been developed for measurement of pH from solid materials for a specific purpose (e.g. soil, sorbents, textiles, pigments, rubber, sludges, petroleum products, compost)
- In CEN TC 292 "Characterization of waste" no specific method has been developed - pH is measured from eluates related to test method developed for a specific scenario/purpose of the testing
- pH is an important parameter measured in leaching tests – choice of the leaching test depends on e.g. the waste property (granular/shaped), the conditions to be addressed in the testing (L/S-ratio etc)
- Pretreatment needs to be taken into account in the interpretation of the test results; e.g. grinding/cutting, homogenization may change the waste properties significantly

## Examples of typical solid waste materials



MSWI bottom ash



Shredder waste



Wood waste



Contaminated concrete waste

## Relevance of high pH in waste management (1)

- High buffer capacity especially against pH decrease is typically seen as favourable property
- High pH is often connected to low release of harmful compounds
- For waste from the extraction industry: Neutralization potential is recognized as a key property in safe management and also to be used in classification as waste as inert<sup>1)</sup>

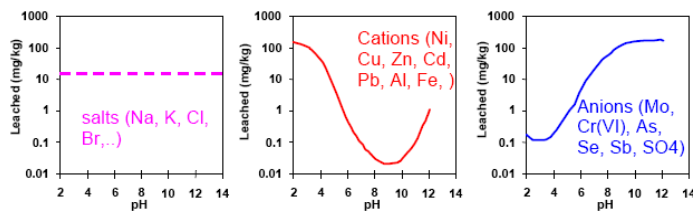
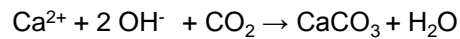
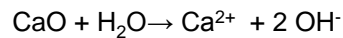


Fig. Hans van der Sloot, ECN, 2008

1) Classification of inert waste (Dir 2006/21/EC, Art 3 and COM decision 2009/359/EC)

## Relevance of high pH in waste management (2)

- Calcium compounds appear typically in wastes with high pH
- A specific feature of alkaline waste is the strong influence of carbonation. Reactions:



- Alkaline leachates are typically not stable, usually pH of leachates decreases with time to pH values below pH 9 (pH 8.3 being equilibrium pH for calcium carbonate).

## Critical alkaline waste streams - examples

Waste type	EWC codes (examples)	Typical pH range	Remarks	Amount in Finland
Reclaimed concrete (demolition waste)	10 13 14, 17 01 01, 19 12 12	pH > 12 (fresh waste)	Fresh concrete surface	0,5 – 1 Mill. t/a
Fly ash from wood and peat combustion	10 01 02, 10 01 03, 10 01 17	pH > 12	Wood ash typically contains potassium hydroxide	0,4 Mill. t/a
APC residues	19 01 07* 19 01 13* 19 01 14	pH > 12	Access of unreacted lime added in the flue gas treatment system	0,1 Mill. t/a
Steel slag	10 02 01 10 02 02	pH > 12		0,2 Mill. t/a
Bottom ash from MSWI	19 01 11* 19 01 12	pH > 10		Appr. 0,3 Mill. t/a
Dust (foundry, metallurgical)	10 10 09* 10 10 10	pH > 10		

## **Remark concerning consequences from Renewable energy directive**

- Directive on renewable energy (2001/77/EC) sets need for use of renewable energy sources (high ambitions for Member states)
- This leads to increase use of biomass and wood chips in energy production significantly e.g. in the Nordic countries
  
- Classification of biomass ashes as hazardous wastes based on pH (or alkalinity) will lead to conflicting situations between different legislations