Common approach for setting environmental self-classifications for metals and metal compounds

Dagobert Heijerick[1], Hugo Waeterschoot[2], Stijn Baken[3] and Jelle Mertens[4]

[1] ARCHE Consulting, Liefkensstraat 35D, 9032 Ghent, Belgium
[2] Eurometaux – European Metals Association, Avenue de Tervueren 168, 1150 Brussels, Belgium
[3] International Copper Association, Avenue de Tervueren 168 b-10, 1150 Brussels, Belgium
[4] EPMF - European Precious Metals Federation, Avenue de Tervueren 168/6, 1150 Brussels, Belgium
E-mail contact: dagobert.heijerick@arche-consulting.be

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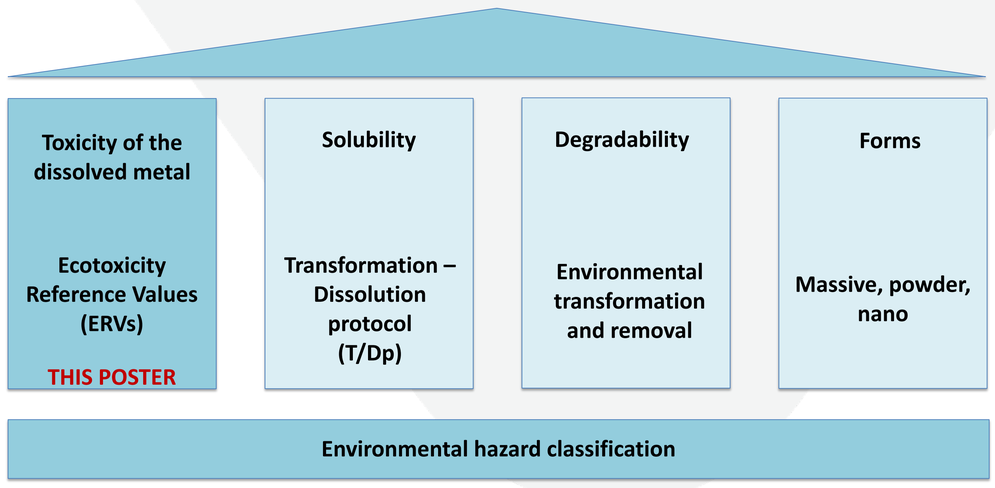
Introduction

Environmental classification approaches that are presented in various international and European regulations, as well as in official guidance documents have been interpreted in different ways by industry and regulators. To promote a common interpretation of these provisions for self-classification, Eurometaux organized an Environmental Classification Workshop (Brussels, December 6-7, 2023), aiming for the development of a common self-classification strategy among metal associations and metal industry.
The proposed classification strategy is stooled on four main pillars (Figure 1) and applies the concept of "the best science available" in relation to the regulatory frameworks and promotes that inorganic substances that have been assigned to the same environmental hazard category for a specific environmental endpoint indeed have comparable hazard profiles. The work presented on this poster focusses on the first pillar, i.e. the derivation of the Ecotoxicity Reference Value (ERV).



Species to be considered

Annex I: *Table 4.1.0*
Classification categories for hazardous to the aquatic environment

(a) Short-term (acute) aquatic hazard	
Category Acute 1: *(Note 1)*	
96 hr LC_{50} (for fish)	*≤ 1 mg/l and/or*
48 hr EC_{50} (for crustacea)	*≤ 1 mg/l and/or*
72 or 96 hr ErC_{50} (for algae or other aquatic plants)	*≤ 1 mg/l. (Note 2)*

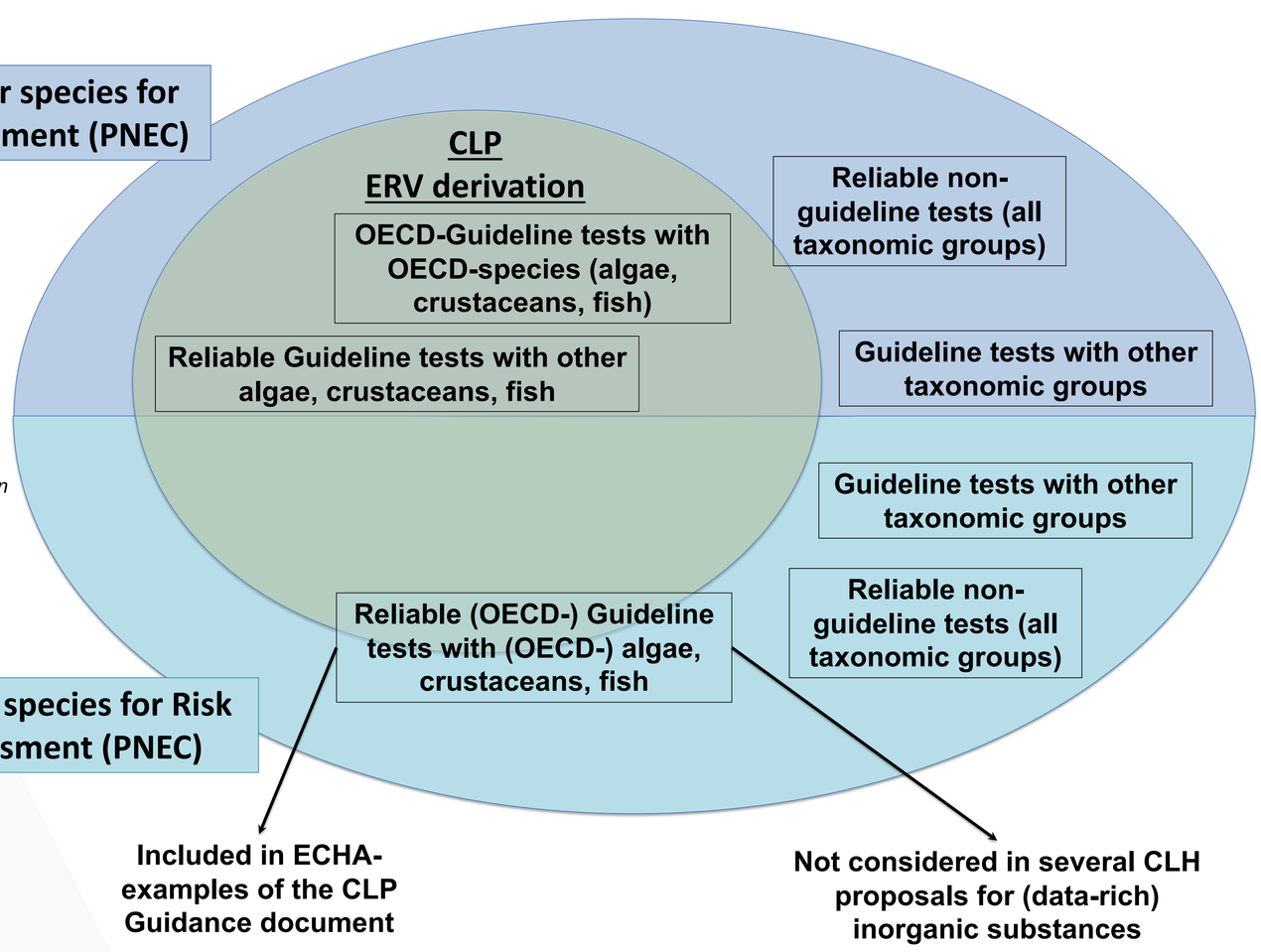
	D.magna	*C.tentans*	*L.stagnalis*	*B.calyciflorus*
Phylum:	Arthropoda	Arthropoda	Mollusca	Rotifera
Sub-phylum:	Crustacea	Hexapoda		
Class:	Branchiopoda	Insecta	Gastropoda	Monogononta
Order:	Anomopoda	Diptera	Basommatophora	Ploima
Family:	Daphniidae	Chironomidae	Lymnaeidae	Brachionidae

Used in ECHA CLP Guidance examples
Used in several CLH proposals for data-rich inorganic substances

The different OECD Guidelines refer to the following species:

- **Algae**: *Raphidocelis subcapitata*, *Desmodesmus subspicatus*, *Navicula pelliculosa*, *Anabaena flos-aquae*, *Synechococcus leopoliensis*;
- **Fish**: *Oncorhynchus mykiss*, *Pimephales promelas*, *Danio rerio*, *Oryzias latipes*, *Cyprinus carpio*:
- **Crustaceans**: *Daphnia* sp (with specific reference to *Daphnia magna*).

- Several **marine species** are also included: *Cyprinodon variegatus*, *Menidia* sp., *Carassius auratus*, *Lepomis macrochirus*, *Clupea harengus*, *Gadus morhua*



Medium to be considered

Taxonomic group & Guideline	Information on test media	Acceptable/Recommended range		
		pH	Hardness (mg $CaCO_3$/L	C-content (mg/L)
Algae OECD 201	Artificial media are defined No reference to natural waters	7.5 – 8.1 (depending on medium); variation <1.5	15-60	Not specified
Crustaceans OECD 202, 211	Artificial media are defined Natural waters are considered suitable	6-9	140 – 250 (for *D.magna*)	< 2
Fish OECD 203, 210, 212, 215, 229	Artificial media are defined Clean natural waters or dechlorinated tap water are considered suitable	6 – 8.5	40 – 250 (preferably < 180)	< 2

Bioavailability corrections?

Normalisation… but to what pH-level? worst-case is metal/species dependent

pH within OECD-range
- For ERV-derivation
- For PNEC-derivation

pH outside OECD-range
- For PNEC-derivation?

pH → **Metal toxicity** ← DOC

DOC: < 2 mg/L
- For ERV-derivation
- For PNEC-derivation

DOC: > 2 mg/L
- For PNEC-derivation

Normalisation… but to what DOC-level?

Dataset 1:
Data for three taxonomic groups:
- Algae & aquatic plants
- Crustaceans
- Fish

Tests equivalent to Standard Guidelines
Medium properties according to OECD Guidelines (pH 6-9 ; DOC <2 mg/L)
Effect levels based on measured Me-concentrations

Dataset 2:
Data for three taxonomic groups:
- Algae & aquatic plants
- Crustaceans
- Fish

Tests equivalent to Standard Guidelines
Medium properties according to OECD Guidelines with exception of DOC-levels (> 2mg/L)
Effect levels based on measured Me-concentrations

Normalisation of data to medium(1) with generic DOC

Normalisation of data to medium (1) with generic DOC and pH 6

Normalisation of data to medium (1) with generic DOC and pH 7

Normalisation of data to medium (1) with generic DOC and pH 8

(1): the same for all organisms, or specific for each taxonomic group (algae, crustaceans, fish)

Approach 1: ERVs for three pH-bands, based on lowest ecotoxicity value per taxonomic group (ERV_{pH6}, ERV_{pH7}, ERV_{pH8})

Approach 2: cfr Approach 1, but lowest value can be replaced by geometric mean values if n ≥ 4 (per species)

Sparingly soluble metal compounds

Approach 3: ERV for a soluble compound is represented by the lowest pH-specific ERV that is derived in Approach 1

Approach 3: ERV for a soluble compound is represented by the lowest pH-specific ERV that is derived in Approach 2

Note: all data across pH can be grouped if pH does not affect ecotoxicity

Soluble metal-compounds