



Exposure Scenarios: Mixing dust in a batch: Zinc Oxide



Noömi Lombaert
Assistant Manager – Environment & Human
Health
International Zinc Association

Eurometaux- Exposure Scenario Workshop
26 March 2009

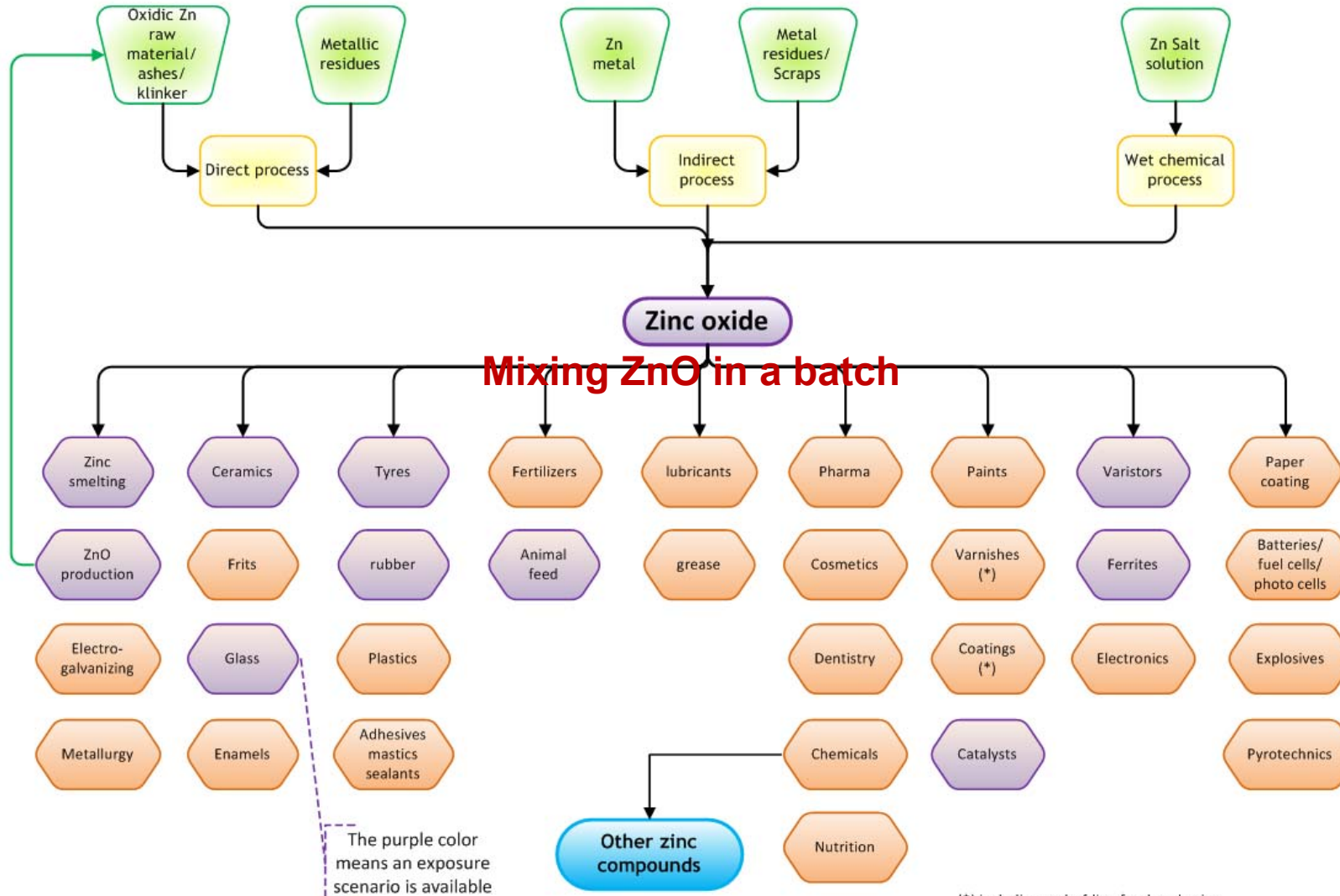
Generic exposure scenarios for metals

Stepwise approach:

1. Compile an inventory of uses/applications of the metal starting from production
2. Mapping of the processes associated with the production and uses of the metal
3. **Characterise** processes with respect to how they are supported by operational conditions, risk management measures (RMMs) and exposure information (qualitative exposure assessment)
4. Group processes in **common processes based on OC, RMMs, exposure routes**
5. **Draft GES** for these identified common processes
The draft GES will include quantitative estimates on exposure levels and risk, and propose some first RMMs and OC to be refined by communication with the DII in the next step



ZnO supply chain



(*) Including end-of-line food packaging



Mixing of powdery material into batch: e.g. ZnO (1)

Mixing ZnO in a batch

→ Mixing of powdery material into batch processes

PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises

PROC5: Mixing or blending in batch processes for formulation of preparations and articles

Mixing of powdery material into
batch: e.g. ZnO (2)

Exposure estimates:

inhalation tier 1 ECETOC TRA:

High fugacity based on high dustiness:
25mg/m³

dermal tier 1 ECETOC TRA:

LEV present: 100 (PROC4)-10 (PROC5)
µg/cm²/day (480 cm²)

No LEV present: 1000 (PROC4)-2000
(PROC5) µg/cm²/day (480 cm²)

ZnO in rubber

Exposure data (EU RA 2008):

Estimated external <u>dermal</u> exposure in mg Zn ²⁺ /day (between brackets internal exposure in mg Zn ²⁺ /day)	MOS	Estimated external <u>inhalation</u> exposure in mg Zn ²⁺ /m ³ (between brackets internal exposure in mg)	MOS
2200 (4.4) 1.1 mg/cm ²	2.3	0.3 (0.6)	17

MOS > 1 means no risk

0.1-0.01 mg/cm ² (LEV) 1-2 mg/cm ² (no LEV)		No estimates with LEV 25 (no LEV)	
--	--	---	--

→ECETOC-TRA model (inhalation) : very conservative

→ECETOC-TRA model (dermal) : acceptable (LEV)

conservative (no LEV)

ZnO for other applications . mixing ZnO in a batch

Inhalation exposure data to Zn or dust in several industries during the use of ZnO
(EU RA)

	industry	Exposure levels (mg Zn/m ³)
Ceramics	Frits, enamels and ceramic ; Pigments	< 0.8
Glass	/	/
Feedstuff	Feedstuff additives	< 5
Catalysts	Catalysts	0.1-2 0.5 (typical)
Ferrites	Ferrites Ferrites (specific company)	<0.1 0.18-0.92

→ No scenarios developed in EU-RA

↓
<< exposure estimates





Generic exposure scenario (GES) for identified common processes

Should include:

- Quantitative estimates on exposure levels and risk
- Propose some RMM & OC to refine with DU

GES Mixing of powdery material into batch processes (1)

- PROC: 4-5
- Operational conditions (OC): large volume, >4 hours/day
- Temperature of the process: high T (>100°C)
- Physical form of material: powder
- Physical form of exposure: dust
- Relevant exposure routes for workers: inhalation/dermal

GES Mixing of powdery material into batch processes (2)

- Exposure estimates: data from RA (cfr rubber) or supplied by M/I/DU, otherwise modelled estimates (cfr ECETOC-TRA model)
- RMM: LEV, RPE, protective gloves/clothing, general good hygiene

Use of GES in some ZnO applications

Rubber – Glass – Ceramics

Operational conditions (OC):

Volume:

high (if automated process): mainly for glass & ceramics

Low (manual processing → more exposure risk!): rubber



Duration: >4hours/day: glass & ceramics
2 hours/day: rubber

Conclusions

- GES are useful for common processes, covering many different ES for different uses
- Take into account information from DU
- If exposure estimates are available rely on them because modelled exposure estimates can be too conservative