# SAFETY DATA SHEET

Based upon Regulation (EC) No 1907/2006, as amended by Regulation (EU) No 2020/878

# manganese dioxide

## SECTION 1: Identification of the substance/mixture and of the company/undertaking

### 1.1. Product identifier

**Product name** : manganese dioxide
**Synonyms** : MnO2 rich material, cell mud, anode mud, MnO2 sludge, Pb Mn cell mud, manganese sludge, anode cleaning sludge; slimes and sludges, zinc sulfate electrolytic
**Registration number REACH** : 01-2119467168-30-0000 (Nyrstar Belgium NV/SA)
01-2119467168-30-0003 (Nyrstar Budel BV)
01-2119467168-30-0006 (Nyrstar France SAS)
**Product type REACH** : Transported isolated intermediate
: On-site isolated intermediate
**CAS number** : 69012-43-7
**EC number** : 273-742-8

### 1.2. Relevant identified uses of the substance or mixture and uses advised against

#### 1.2.1 Relevant identified uses

Under Regulation (EC) No 1907/2006 the substance is defined as an on-site and transported isolated intermediate and must be used in correspondence to that status, including the application of strictly controlled conditions

Industrial use: manufacturing of chemicals

For further details concerning the management measures: see the attached annex

#### 1.2.2 Uses advised against

No uses advised against known

### 1.3. Details of the supplier of the safety data sheet

**Supplier of the safety data sheet**

Nyrstar Belgium N.V. on behalf of Nyrstar Sales & Marketing A.G.
Zinkstraat 1
B-2490 Balen
☎ +32 14 44 95 00
🖷 +32 14 81 05 31
infoSDS@nyrstar.com

Nyrstar Budel B.V. on behalf of Nyrstar Sales & Marketing A.G.
Hoofdstraat 1
6024 AA Budel-Dorplein
☎ +32 14 44 96 80
🖷 +32 14 44 95 52
infoSDS@nyrstar.com

Nyrstar France S.A.S. on behalf of Nyrstar Sales & Marketing A.G.
Rue Jean Jacques Rousseau
F-59950 Auby
☎ +32 14 44 96 80
🖷 +33 3 27 88 39 48
infoSDS@nyrstar.com

**Manufacturer of the product**

Nyrstar Sales & Marketing SA
1 Rue de Jargonnant
CH-1207 Geneva
infoSDS@nyrstar.com

### 1.4. Emergency telephone number

24h/24h (Telephone advice: English, French, German, Dutch) :
+32 14 58 45 45 (BIG)

## SECTION 2: Hazards identification

### 2.1. Classification of the substance or mixture

Classified as dangerous according to the criteria of Regulation (EC) No 1272/2008

| Class | Category | Hazard statements |
|---|---|---|
| Carc. | category 2 | H351: Suspected of causing cancer. |
| Repr. | category 1A | H360: May damage fertility or the unborn child. |
| STOT RE | category 1 | H372: Causes damage to organs (central nervous system, reproductive organs) through prolonged or repeated exposure if swallowed. |
| Acute Tox. | category 4 | H332: Harmful if inhaled. |
| Acute Tox. | category 4 | H302: Harmful if swallowed. |

| | | |
|---|---|---|
| Aquatic Acute | category 1 | H400: Very toxic to aquatic life. |
| Aquatic Chronic | category 1 | H410: Very toxic to aquatic life with long lasting effects. |

### 2.2. Label elements

**Signal word** Danger

**H-statements**

| | |
|---|---|
| H351 | Suspected of causing cancer. |
| H360 | May damage fertility or the unborn child. |
| H372 | Causes damage to organs (central nervous system, reproductive organs) through prolonged or repeated exposure if swallowed. |
| H302 + H332 | Harmful if swallowed or if inhaled. |
| H410 | Very toxic to aquatic life with long lasting effects. |

**P-statements**

| | |
|---|---|
| P280 | Wear protective gloves, protective clothing and eye protection/face protection. |
| P260 | Do not breathe dust. |
| P304 + P340 | IF INHALED: Remove person to fresh air and keep comfortable for breathing. |
| P330 | Rinse mouth. |
| P308 + P313 | IF exposed or concerned: Get medical advice/attention. |
| P312 | Call a POISON CENTER/doctor if you feel unwell. |

**Supplemental information**

Restricted to professional users.

### 2.3. Other hazards

No other hazards known

## SECTION 3: Composition/information on ingredients

### 3.1. Substances

| Name<br>REACH Registration No | CAS No<br>EC No | Conc. (C) | Classification according to CLP | Note | Remark | M-factors and ATE |
|---|---|---|---|---|---|---|
| zinc oxide | 1314-13-2<br>215-222-5 | 0%<C<1% | Aquatic Acute 1; H400<br>Aquatic Chronic 1; H410 | (1)(2) | Component | M: 1 (Acute, ECHA)<br>M: 1 (Chronic, ECHA) |
| lead(II)sulphate | 7446-14-2<br>231-198-9 | 2.93%<br><C<29.27% | Repr. 1A; H360Df<br>Acute Tox. 4; H332<br>Acute Tox. 4; H302<br>STOT RE 2; H373<br>Aquatic Acute 1; H400<br>Aquatic Chronic 1; H410<br>Repr. 2; H361f: C≥2,5%, (CLP Annex VI (ATP 0))<br>STOT RE 2; H373: C≥0,5%, (CLP Annex VI (ATP 0)) | (1)(2)(10) | Component | M: 1 (Acute, BIG) |
| manganese dioxide | 1313-13-9<br>215-202-6 | 55.36%<br><C<94.91% | Acute Tox. 4; H332<br>Acute Tox. 4; H302<br>STOT RE 2; H373 | (1)(2)(6) | Component | |
| calcium sulfate | 7778-18-9<br>231-900-3 | 0%<br><C<4.85% | | (2) | Component | |
| strontium sulphate | 7759-02-6<br>231-850-2 | 0%<br><C<5.24% | | | Component | |

(1) For H- and EUH-statements in full: see section 16
(2) Substance with a Community workplace exposure limit
(6) Enumerated in Annex VI of Regulation (EC) No. 1272/2008 but the classification has been adapted after evaluation of available test data
(10) Subject to restrictions of Annex XVII of Regulation (EC) No. 1907/2006

### 3.2. Mixtures

Not applicable

## SECTION 4: First aid measures

### 4.1. Description of first aid measures

**General:**
Check the vital functions. Unconscious: maintain adequate airway and respiration. Respiratory arrest: artificial respiration or oxygen. Cardiac arrest: perform resuscitation. Victim conscious with laboured breathing: half-seated. Victim in shock: on his back with legs slightly raised. Vomiting: prevent asphyxia/aspiration pneumonia. Prevent cooling by covering the victim (no warming up). Keep watching the victim. Give psychological aid. Keep the victim calm, avoid physical strain. Depending on the victim's condition: doctor/hospital.

**After inhalation:**
Remove the victim into fresh air. Respiratory problems: consult a doctor/medical service.

**After skin contact:**
Rinse with water. Soap may be used. Take victim to a doctor if irritation persists.

**After eye contact:**
Rinse with water. Remove contact lenses, if present and easy to do. Continue rinsing. Take victim to an ophthalmologist if irritation persists.

**After ingestion:**
Rinse mouth with water. Immediately after ingestion: give lots of water to drink. Do not induce vomiting. Consult a doctor/medical service if you feel unwell.

### 4.2. Most important symptoms and effects, both acute and delayed

**4.2.1 Acute symptoms**

**After inhalation:**
No effects known.

**After skin contact:**
No effects known.

**After eye contact:**
No effects known.

**After ingestion:**
Vomiting. Abdominal pain. Diarrhoea. Irritation of the gastric/intestinal mucosa.

**4.2.2 Delayed symptoms**
No effects known.

### 4.3. Indication of any immediate medical attention and special treatment needed

If applicable and available it will be listed below.

## SECTION 5: Firefighting measures

The information in this section is a general description. If available, the documentation for isolated intermediates will be attached in annex to support safe handling arrangements.

### 5.1. Extinguishing media

**5.1.1 Suitable extinguishing media:**
Adapt extinguishing media to the environment for surrounding fires.

**5.1.2 Unsuitable extinguishing media:**
Not applicable.

### 5.2. Special hazards arising from the substance or mixture

On burning: release of harmful/irritant gases/vapours.

### 5.3. Advice for firefighters

**5.3.1 Instructions:**
Take account of environmentally hazardous firefighting water. Use water moderately and if possible collect or contain it.

**5.3.2 Special protective equipment for fire-fighters:**
Gloves (EN 374). Safety glasses (EN 166). Protective clothing (EN 14605 or EN 13034). Reactivity hazard: self-contained breathing apparatus (EN 136 + EN 137). Reactivity hazard: gas-tight suit (EN 943). Dust cloud production: self-contained breathing apparatus (EN 136 + EN 137). Heat/fire exposure: self-contained breathing apparatus (EN 136 + EN 137).

## SECTION 6: Accidental release measures

The information in this section is a general description. If available, the documentation for isolated intermediates will be attached in annex to support safe handling arrangements.

### 6.1. Personal precautions, protective equipment and emergency procedures

Prevent dust cloud formation. No naked flames.

**6.1.1 Protective equipment for non-emergency personnel**
See section 8.2

**6.1.2 Protective equipment for emergency responders**
Gloves (EN 374). Safety glasses (EN 166). Protective clothing (EN 14605 or EN 13034). Reactivity hazard: self-contained breathing apparatus (EN 136 + EN 137). Reactivity hazard: gas-tight suit (EN 943). Dust cloud production: self-contained breathing apparatus (EN 136 + EN 137).

Suitable protective clothing
See section 8.2

### 6.2. Environmental precautions

Contain released product, collect/pump into suitable containers. Plug the leak, cut off the supply. Dam up the solid spill. Knock down/dilute dust cloud with water spray. Take account of toxic/corrosive precipitation water. Prevent soil and water pollution. Prevent spreading in sewers.

### 6.3. Methods and material for containment and cleaning up

Prevent dust cloud formation. Scoop solid spill into closing containers. Carefully collect the spill/leftovers. Clean contaminated surfaces with an excess of water. Take collected spill to manufacturer/competent authority. Wash clothing and equipment after handling.

### 6.4. Reference to other sections

See section 13.

## SECTION 7: Handling and storage

The information in this section is a general description. If available, the documentation for isolated intermediates will be attached in annex to support safe handling arrangements.

### 7.1. Precautions for safe handling

Avoid raising dust. Keep away from naked flames/heat. Observe very strict hygiene - avoid contact. Remove contaminated clothing immediately. Do not discharge the waste into the drain. Keep container tightly closed.

### 7.2. Conditions for safe storage, including any incompatibilities

**7.2.1 Safe storage requirements:**

Store in a dry area. Keep only in the original container. Store at ambient temperature. Meet the legal requirements.

**7.2.2 Keep away from:**

Heat sources, combustible materials, oxidizing agents, reducing agents, (strong) acids, organic materials.

**7.2.3 Suitable packaging material:**

No data available

**7.2.4 Non suitable packaging material:**

No data available

### 7.3. Specific end use(s)

If available, the documentation for isolated intermediates will be attached in annex to support safe handling arrangements.

## SECTION 8: Exposure controls/personal protection

### 8.1. Control parameters

**8.1.1 Occupational exposure**

**a) Occupational exposure limit values**

If limit values are applicable and available these will be listed below.

**EU**

| | | |
|---|---|---|
| Inorganic lead and its compounds | Time-weighted average exposure limit 8 h (Binding occupational exposure limit value) | 0.15 mg/m³ |
| Manganese and inorganic manganese compounds (as manganese) | Time-weighted average exposure limit 8 h (Indicative occupational exposure limit value) | 0.05 mg/m³ (2) |
| | Time-weighted average exposure limit 8 h (Indicative occupational exposure limit value) | 0.2 mg/m³ (1) |

(2): Respirable fraction
(1): Inhalable fraction

**Belgium**

| | | |
|---|---|---|
| Calcium (sulfate de) (anhydrate, hemihydrate, dihydrate, gypse) | Time-weighted average exposure limit 8 h | 10 mg/m³ |
| Manganèse et ses composés (en Mn) (fraction respirable) | Time-weighted average exposure limit 8 h | 0.2 mg/m³ |
| Plomb inorg. (poussières et fumées) (en Pb) | Time-weighted average exposure limit 8 h | 0.15 mg/m³ |
| Zinc (oxyde de) (fraction alvéolaire) | Time-weighted average exposure limit 8 h | 2 mg/m³ |
| | Short time value | 10 mg/m³ |

**The Netherlands**

| | | |
|---|---|---|
| Lood en anorganische loodverbindingen | Time-weighted average exposure limit 8 h (Public occupational exposure limit value) | 0.15 mg/m³ |
| Mangaan en anorganische mangaan-verbindingen (als mangaan) | Time-weighted average exposure limit 8 h (Public occupational exposure limit value) | 0.05 mg/m³ |
| | Time-weighted average exposure limit 8 h (Public occupational exposure limit value) | 0.2 mg/m³ |

**France**

| | | |
|---|---|---|
| Calcium (sulfate de) | Time-weighted average exposure limit 8 h (VL: Valeur non réglementaire indicative) | 10 mg/m³ |
| Manganèse et ses composés fraction alvéolaire exprimé en manganèse | Time-weighted average exposure limit 8 h (VRI: Valeur réglementaire indicative) | 0.05 mg/m³ |
| Manganèse et ses composés fraction inhalable exprimé en manganèse | Time-weighted average exposure limit 8 h (VRI: Valeur réglementaire indicative) | 0.20 mg/m³ |
| Plomb métallique et composés, en Pb | Time-weighted average exposure limit 8 h (VRC: Valeur réglementaire contraignante) | 0.1 mg/m³ |

| | | |
|---|---|---|
| Zinc (oxyde de, fumées) | Time-weighted average exposure limit 8 h (VL: Valeur non réglementaire indicative) | 5 mg/m³ |
| Zinc (oxyde de, poussières) | Time-weighted average exposure limit 8 h (VL: Valeur non réglementaire indicative) | 10 mg/m³ |

**Germany**

| | | |
|---|---|---|
| Blei und anorganischen Bleiverbindungen | Time-weighted average exposure limit 8 h (TRGS 505) | 0.1 mg/m³ |
| Calciumsulfat | Time-weighted average exposure limit 8 h (TRGS 900) | 6 mg/m³ |
| Mangan und seine anorganischen Verbindungen | Time-weighted average exposure limit 8 h (TRGS 900) | 0.02 mg/m³ |
| | Time-weighted average exposure limit 8 h (TRGS 900) | 0.2 mg/m³ |

**Austria**

| | | |
|---|---|---|
| Calciumsulfat | Tagesmittelwert (MAK) | 5 mg/m³ |
| | Kurzzeitwert 60(Miw) 2x (MAK) | 10 mg/m³ |

**UK**

| | | |
|---|---|---|
| Lead other than lead alkyls | Time-weighted average exposure limit 8 h (Occupational exposure limit (Control of lead at work)) | 0.15 mg/m³ |
| Manganese and its inorganic compounds (as Mn) (Inhalable fraction) | Time-weighted average exposure limit 8 h (Workplace exposure limit (EH40/2005)) | 0.2 mg/m³ |
| Manganese and its inorganic compounds (as Mn) (Respirable fraction) | Time-weighted average exposure limit 8 h (Workplace exposure limit (EH40/2005)) | 0.05 mg/m³ |

**USA (TLV-ACGIH)**

| | | |
|---|---|---|
| Calcium sulfate | Time-weighted average exposure limit 8 h (TLV - Adopted Value) | 10 mg/m³ (I) |
| Lead and inorganic compounds, as Pb | Time-weighted average exposure limit 8 h (TLV - Adopted Value) | 0.05 mg/m³ |
| Manganese, elemental and inorganic compounds, as Mn | Time-weighted average exposure limit 8 h (TLV - Adopted Value) | 0.02 mg/m³ (R) |
| | Time-weighted average exposure limit 8 h (TLV - Adopted Value) | 0.1 mg/m³ (I) |
| Zinc oxide | Time-weighted average exposure limit 8 h (TLV - Adopted Value) | 2 mg/m³ (R) |
| | Short time value (TLV - Adopted Value) | 10 mg/m³ (R) |

(I): Inhalable fraction
(R): Respirable fraction

**b) National biological limit values**

If limit values are applicable and available these will be listed below.

**Belgium**

| | | | |
|---|---|---|---|
| Plomb et ses composés ioniques (Lood) | sang | 70 µg/100ml | |

**USA (BEI-ACGIH)**

| | | | |
|---|---|---|---|
| Lead and inorganic compounds (Lead) | Blood: not critical | 200 µg/L | Persons applying this BEI® are encouraged to counsel female workers of child-bearing age about the risk of delivering a child with a PbB over the current CDC reference value. |

**8.1.2 Sampling methods**

| Product name | Test | Number |
|---|---|---|
| Lead | OSHA | ID 121 |
| Lead | OSHA | ID 125G |
| Sulfites, & Sulfates | NIOSH | 6004 |
| Zinc (Elements) | NIOSH | 7300 |
| Zinc (Zn) | NIOSH | 7302 |
| Zinc (Zn) | NIOSH | 7304 |
| Zinc Oxide | NIOSH | 7030 |
| Zinc Oxide | NIOSH | 7502 |
| Zinc Oxide | OSHA | ID 121 |
| Zinc Oxide | OSHA | ID 143 |

**8.1.3 Applicable limit values when using the substance or mixture as intended**

If limit values are applicable and available these will be listed below.

**8.1.4 Threshold values**

**DNEL/DMEL - Workers**

zinc oxide

| Effect level (DNEL/DMEL) | Type | Value | Remark |
|---|---|---|---|
| DNEL | Long-term systemic effects inhalation | 5 mg/m³ | |
| | Long-term local effects inhalation | 0.5 mg/m³ | |
| | Long-term systemic effects dermal | 83 mg/kg bw/day | |

manganese dioxide

| Effect level (DNEL/DMEL) | Type | Value | Remark |
|---|---|---|---|
| DNEL | Long-term systemic effects inhalation | 0.06 mg/m³ | |
| | Long-term systemic effects dermal | 0.004 mg/kg bw/day | |

calcium sulfate

| Effect level (DNEL/DMEL) | Type | Value | Remark |
|---|---|---|---|
| DNEL | Long-term systemic effects inhalation | 21.17 mg/m³ | |
| | Acute systemic effects inhalation | 5082 mg/m³ | |

**DNEL/DMEL - General population**

zinc oxide

| Effect level (DNEL/DMEL) | Type | Value | Remark |
|---|---|---|---|
| DNEL | Long-term systemic effects inhalation | 2.5 mg/m³ | |
| | Long-term systemic effects dermal | 83 mg/kg bw/day | |
| | Long-term systemic effects oral | 0.83 mg/kg bw/day | |

manganese dioxide

| Effect level (DNEL/DMEL) | Type | Value | Remark |
|---|---|---|---|
| DNEL | Long-term systemic effects inhalation | 0.043 mg/m³ | |
| | Long-term systemic effects dermal | 0.002 mg/kg bw/day | |

calcium sulfate

| Effect level (DNEL/DMEL) | Type | Value | Remark |
|---|---|---|---|
| DNEL | Long-term systemic effects inhalation | 5.29 mg/m³ | |
| | Acute systemic effects inhalation | 3811 mg/m³ | |
| | Long-term systemic effects oral | 1.52 mg/kg bw/day | |
| | Acute systemic effects oral | 11.4 mg/kg bw/day | |

**PNEC**

zinc oxide

| Compartments | Value | Remark |
|---|---|---|
| Fresh water | 20.6 µg/l | |
| Marine water | 6.1 µg/l | |
| STP | 100 µg/l | |
| Fresh water sediment | 117.8 mg/kg sediment dw | |
| Marine water sediment | 56.5 mg/kg sediment dw | |
| Soil | 35.6 mg/kg soil dw | |

manganese dioxide

| Compartments | Value | Remark |
|---|---|---|
| Fresh water | < 0.01 mg/l | |
| Marine water | < 0.01 mg/l | |
| Aqua (intermittent releases) | 0.001 mg/l | |
| STP | 100 mg/l | |
| Fresh water sediment | 0.037 mg/kg sediment dw | |
| Marine water sediment | 0.004 mg/kg sediment dw | |
| Soil | 0.028 mg/kg soil dw | |

calcium sulfate

| Compartments | Value | Remark |
|---|---|---|
| STP | 100 mg/l | |

**8.1.5 Control banding**

If applicable and available it will be listed below.

## 8.2. Exposure controls

The information in this section is a general description. If available, the documentation for isolated intermediates will be attached in annex to support safe handling arrangements.

**8.2.1 Appropriate engineering controls**

Avoid raising dust. Keep away from naked flames/heat. Measure the concentration in the air regularly. Carry operations in the open/under local exhaust/ventilation or with respiratory protection.

**8.2.2 Individual protection measures, such as personal protective equipment**

Observe very strict hygiene - avoid contact. Do not eat, drink or smoke during work.

a) Respiratory protection:

Dust production: dust mask with filter type P3. High dust production: self-contained breathing apparatus (EN 136 + EN 137).

b) Hand protection:

Gloves.

| Materials | Remark |
|---|---|
| butyl rubber | Good resistance |
| chlorinated polyethylene | Good resistance |
| nitrile rubber | Good resistance |
| neoprene | Good resistance |
| PVC | Good resistance |
| chlorinated polyethylene | Good resistance |

c) Eye protection:

Safety glasses (EN 166). In case of dust production: protective goggles (EN 166).

d) Skin protection:

Protective clothing (EN 14605 or EN 13034). Dustproof clothing (EN 13982).

**8.2.3 Environmental exposure controls:**

See sections 6.2, 6.3 and 13

## SECTION 9: Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

| | |
|---|---|
| Physical form | Solid |
| Odour | Odourless |
| Odour threshold | Not applicable |
| Colour | Grey to brown-black |
| Particle size | D50 ; 929 µm |
| | D80 ; 2083 µm |
| Explosion limits | No data available |
| Flammability | Not classified as flammable |
| Log Kow | Not applicable |
| Dynamic viscosity | No data available |
| Kinematic viscosity | No data available |
| Melting point | 193 °C ; 1013 hPa ; EU Method A.1 |
| Boiling point | No data available |
| Relative vapour density | Not applicable |
| Vapour pressure | Not applicable |
| Solubility | Water ; 28 mg/l ; 20 °C ; OECD 105 |
| Relative density | 4.1 ; 22 °C ; EU Method A.3 |
| Absolute density | 4090 kg/m³ ; 22 °C |
| Decomposition temperature | 193 °C ; EU Method A.1 ; 1013 hPa |
| Auto-ignition temperature | Not applicable |
| Flash point | Not applicable |
| pH | 2.28 - 2.32 ; 28 mg/l ; 20 °C ; OECD 105 |

### 9.2. Other information

No data available

## SECTION 10: Stability and reactivity

### 10.1. Reactivity

No data available.

### 10.2. Chemical stability

Stable under normal conditions.

### 10.3. Possibility of hazardous reactions

Reacts with many compounds: (increased) risk of fire/explosion. Reacts with (some) acids: release of toxic and corrosive gases/vapours.

### 10.4. Conditions to avoid

**Precautionary measures**

Avoid raising dust. Keep away from naked flames/heat.

### 10.5. Incompatible materials

Combustible materials, oxidizing agents, reducing agents, (strong) acids, organic materials.

### 10.6. Hazardous decomposition products

No data available.

## SECTION 11: Toxicological information

### 11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008

**11.1.1 Test results**

**Acute toxicity**

manganese dioxide

No (test)data available

zinc oxide

| Route of exposure | Parameter | Method | Value | Exposure time | Species | Value determination | Remark |
|---|---|---|---|---|---|---|---|
| Oral | LD50 | Equivalent to OECD 401 | > 5000 mg/kg | | Rat (male / female) | Experimental value | |
| Dermal | LD50 | OECD 402 | > 2000 mg/kg bw | 24 h | Rat (male / female) | Experimental value | |
| Inhalation (dust) | LC50 | Equivalent to OECD 403 | > 5.7 mg/l | 4 h | Rat (male / female) | Experimental value | |

lead(II)sulphate

| Route of exposure | Parameter | Method | Value | Exposure time | Species | Value determination | Remark |
|---|---|---|---|---|---|---|---|
| Oral | | | category 4 | | | Annex VI | |
| Inhalation | | | category 4 | | | Annex VI | |

manganese dioxide

| Route of exposure | Parameter | Method | Value | Exposure time | Species | Value determination | Remark |
|---|---|---|---|---|---|---|---|
| Oral (drinking water) | LD50 | | > 3480 mg/kg bw | | Rat (male) | Experimental value | |
| Oral | | | category 4 | | | Annex VI | |
| Dermal | | | | | | Data waiving | |
| Inhalation | | | category 4 | | | Annex VI | |

calcium sulfate

| Route of exposure | Parameter | Method | Value | Exposure time | Species | Value determination | Remark |
|---|---|---|---|---|---|---|---|
| Oral | LD50 | OECD 420 | > 1581 mg/kg bw | | Rat (female) | Experimental value | |
| Dermal | | | | | | Data waiving | |
| Inhalation (dust) | LC50 | OECD 403 | > 2.61 mg/l air | 4 h | Rat (male / female) | Experimental value | |

**Conclusion**

Harmful if swallowed.
Harmful if inhaled.
Not classified as acute toxic in contact with skin

**Corrosion/irritation**

manganese dioxide

No (test)data available

zinc oxide

| Route of exposure | Result | Method | Exposure time | Time point | Species | Value determination | Remark |
|---|---|---|---|---|---|---|---|
| Eye | Not irritating | OECD 405 | 24 h | 24; 72 hours | Rabbit | Experimental value | |
| Skin | Not irritating | OECD 404 | 24 h | 24 hours | Rabbit | Experimental value | |
| Not applicable (in vitro test) | Not corrosive | OECD 431 | 3 minutes | 24; 72 hours | Reconstructed human epidermis | Experimental value | |

manganese dioxide

| Route of exposure | Result | Method | Exposure time | Time point | Species | Value determination | Remark |
|---|---|---|---|---|---|---|---|
| Eye | Slightly irritating | OECD 405 | | 24; 48; 72 hours | Rat | Experimental value | |
| Skin | Not irritating | OECD 404 | 4 h | 24; 48; 72 hours | Rat | Experimental value | |

calcium sulfate

| Route of exposure | Result | Method | Exposure time | Time point | Species | Value determination | Remark |
|---|---|---|---|---|---|---|---|
| Eye | Not irritating | OECD 405 | | 24; 48; 72 hours | Rabbit | Experimental value | Single treatment |
| Skin | Not irritating | OECD 404 | 4 h | 24; 48; 72 hours | Rabbit | Experimental value | |

**Conclusion**

Not classified as irritating to the skin
Not classified as irritating to the eyes
Not classified as irritating to the respiratory system

**Respiratory or skin sensitisation**

manganese dioxide

No (test)data available

zinc oxide

| Route of exposure | Result | Method | Exposure time | Observation time point | Species | Value determination | Remark |
|---|---|---|---|---|---|---|---|
| Skin | Not sensitizing | OECD 406 | | | Guinea pig (female) | Experimental value | |
| Skin | Not sensitizing | Human observation | 2 days (continuous) | 72 hours | Human | Experimental value | |

manganese dioxide

| Route of exposure | Result | Method | Exposure time | Observation time point | Species | Value determination | Remark |
|---|---|---|---|---|---|---|---|
| Skin | Not sensitizing | OECD 429 | | | Mouse (female) | Experimental value | |

calcium sulfate

| Route of exposure | Result | Method | Exposure time | Observation time point | Species | Value determination | Remark |
|---|---|---|---|---|---|---|---|
| Skin | Not sensitizing | OECD 406 | | | Guinea pig (male) | Experimental value | |

**Conclusion**

Not classified as sensitizing for skin

Not classified as sensitizing for inhalation

**Specific target organ toxicity**

manganese dioxide

No (test)data available

zinc oxide

| Route of exposure | Parameter | Method | Value | Organ | Effect | Exposure time | Species | Value determination |
|---|---|---|---|---|---|---|---|---|
| Oral (diet) | NOEL | OECD 408 | 3000 ppm | | No effect | 13 weeks (daily) | Rat (male / female) | Read-across |
| Dermal | LOAEL | OECD 410 | 75 mg/kg bw/day | | Systemic effects | 4 weeks (6h / day, 5 days / week) | Rat (male / female) | Experimental value |
| Inhalation (aerosol) | NOAEL | OECD 413 | 1.5 mg/m³ air | | No effect | 13 weeks (6h / day, 5 days / week) | Rat (male) | Experimental value |

lead(II)sulphate

| Route of exposure | Parameter | Method | Value | Organ | Effect | Exposure time | Species | Value determination |
|---|---|---|---|---|---|---|---|---|
| Unknown | | | STOT RE cat.2 | | | | | Annex VI |
| Oral (diet) | Dose level | | 500 ppm | Blood | Change in the haemogramme/blood composition | 7 weeks (daily) | Bovine (male) | Experimental value |

manganese dioxide

| Route of exposure | Parameter | Method | Value | Organ | Effect | Exposure time | Species | Value determination |
|---|---|---|---|---|---|---|---|---|
| Oral | | | | | | | | Data waiving |
| Dermal | | | | | | | | Data waiving |
| Inhalation (dust) | | Human observation study | | | neurotoxic effects | | Human | Experimental value |
| Inhalation | | | STOT RE cat.2 | Brain | Brain affection | | | Expert judgement |

calcium sulfate

| Route of exposure | Parameter | Method | Value | Organ | Effect | Exposure time | Species | Value determination |
|---|---|---|---|---|---|---|---|---|
| Oral (stomach tube) | NOAEL | OECD 422 | 79 mg/kg bw/day | Blood | No effect | 35 day(s) | Rat (male) | Experimental value |
| Oral (stomach tube) | LOAEL | OECD 422 | 237 mg/kg bw/day | Blood | Change in the haemogramme/blood composition | 35 day(s) | Rat (male) | Experimental value |
| Dermal | | | | | | | | Data waiving |

**Conclusion**

Causes damage to organs (central nervous system, reproductive organs) through prolonged or repeated exposure if swallowed.

**Mutagenicity (in vitro)**

manganese dioxide

No (test)data available

zinc oxide

| Result | Method | Test substrate | Effect | Value determination | Remark |
|---|---|---|---|---|---|
| Negative with metabolic activation, negative without metabolic activation | OECD 471 | Bacteria (S.typhimurium) | No effect | Experimental value | |
| Ambiguous | OECD 476 | Mouse (lymphoma L5178Y cells) | | Experimental value | |

lead(II)sulphate

| Result | Method | Test substrate | Effect | Value determination | Remark |
|---|---|---|---|---|---|
| Negative with metabolic activation, negative without metabolic activation | Ames test | Bacteria (S.typhimurium) | | Experimental value | |

manganese dioxide

| Result | Method | Test substrate | Effect | Value determination | Remark |
|---|---|---|---|---|---|
| Negative with metabolic activation, negative without metabolic activation | OECD 471 | Bacteria (S.typhimurium) | | Experimental value | |
| Negative with metabolic activation, negative without metabolic activation | OECD 473 | Human lymphocytes | | Experimental value | |

calcium sulfate

| Result | Method | Test substrate | Effect | Value determination | Remark |
|---|---|---|---|---|---|
| Negative with metabolic activation, negative without metabolic activation | OECD 471 | Bacteria (S.typhimurium) | No effect | Experimental value | |
| Negative with metabolic activation, negative without metabolic activation | OECD 471 | Escherichia coli | No effect | Experimental value | |
| Negative with metabolic activation, negative without metabolic activation | OECD 476 | Mouse (lymphoma L5178Y cells) | No effect | Experimental value | |

**Mutagenicity (in vivo)**

manganese dioxide

No (test)data available

zinc oxide

| Result | Method | Exposure time | Test substrate | Organ | Value determination |
|---|---|---|---|---|---|
| Negative (Intraperitoneal) | OECD 474 | | Mouse (male) | Bone marrow | Experimental value |

manganese dioxide

| Result | Method | Exposure time | Test substrate | Organ | Value determination |
|---|---|---|---|---|---|
| Negative (Oral (stomach tube)) | OECD 474 | | Mouse (female) | | Experimental value |

calcium sulfate

| Result | Method | Exposure time | Test substrate | Organ | Value determination |
|---|---|---|---|---|---|
| Negative (Oral (diet)) | OECD 474 | | Mouse (male) | | Experimental value |

**Conclusion**

Not classified for mutagenic or genotoxic toxicity

**Carcinogenicity**

manganese dioxide

No (test)data available

zinc oxide

| Route of exposure | Parameter | Method | Value | Exposure time | Species | Effect | Organ | Value determination |
|---|---|---|---|---|---|---|---|---|
| Oral (drinking water) | NOAEL | Carcinogenic toxicity study | > 22000 mg/l | 52 week(s) | Mouse (male / female) | No carcinogenic effect | | Read-across |

manganese dioxide

| Route of exposure | Parameter | Method | Value | Exposure time | Species | Effect | Organ | Value determination |
|---|---|---|---|---|---|---|---|---|
| Unknown | | | | | | | | Data waiving |

calcium sulfate

| Route of exposure | Parameter | Method | Value | Exposure time | Species | Effect | Organ | Value determination |
|---|---|---|---|---|---|---|---|---|
| Oral (diet) | NOAEL | Carcinogenic toxicity study | 256 mg/kg bw/day | 104 weeks (daily) | Rat (male) | No carcinogenic effect | | Experimental value |
| Oral (diet) | NOAEL | Carcinogenic toxicity study | 284 mg/kg bw/day | 104 weeks (daily) | Rat (female) | No carcinogenic effect | | Experimental value |

**Conclusion**

Suspected of causing cancer.

**Reproductive toxicity**

manganese dioxide

No (test)data available

zinc oxide

| | Parameter | Method | Value | Exposure time | Species | Effect | Organ | Value determination |
|---|---|---|---|---|---|---|---|---|
| Developmental toxicity (Inhalation (aerosol)) | NOAEC | OECD 414 | 7.5 mg/kg bw/day | 14 days (6h / day) | Rat | No effect | Foetus | Experimental value |
| Maternal toxicity (Inhalation (aerosol)) | NOAEC | OECD 414 | 1.5 mg/kg bw/day | 14 days (6h / day) | Rat | No effect | | Experimental value |
| Effects on fertility (Oral (stomach tube)) | LOAEL (P) | Equivalent to OECD 416 | 7.5 mg/kg bw/day | 22 weeks (daily) | Rat (male / female) | Reproductive performance | | Read-across |

lead(II)sulphate

| | Parameter | Method | Value | Exposure time | Species | Effect | Organ | Value determination |
|---|---|---|---|---|---|---|---|---|
| Developmental toxicity | | | category 1A | | | | | Annex VI |
| Effects on fertility | | | category 2 | | | | | Annex VI |

manganese dioxide

| | Parameter | Method | Value | Exposure time | Species | Effect | Organ | Value determination |
|---|---|---|---|---|---|---|---|---|
| Developmental toxicity (Inhalation (aerosol)) | NOAEL | OECD 414 | 15 mg/m³ air | | Rat | No effect | | Experimental value |
| Maternal toxicity (Inhalation (aerosol)) | NOAEL | OECD 414 | 25 mg/m³ air | | Rat | No effect | | Experimental value |
| Effects on fertility (Oral (drinking water)) | | | | 13 week(s) | Rat (male / female) | No effect | | Experimental value |

calcium sulfate

| | Parameter | Method | Value | Exposure time | Species | Effect | Organ | Value determination |
|---|---|---|---|---|---|---|---|---|
| Developmental toxicity (Oral (stomach tube)) | NOAEL | Equivalent to OECD 414 | 1600 mg/kg bw/day | 10 day(s) | Rat | No effect | General | Experimental value |
| Maternal toxicity (Oral (stomach tube)) | NOAEL | Equivalent to OECD 414 | 1600 mg/kg bw/day | 10 days (gestation, daily) | Rat | No effect | | Experimental value |
| Effects on fertility (Oral (stomach tube)) | NOAEL | OECD 422 | 790 mg/kg bw/day | 2 week(s) | Rat (male / female) | No effect | | Experimental value |

**Conclusion**

May damage fertility or the unborn child.

**Toxicity other effects**

manganese dioxide

No (test)data available

**Chronic effects from short and long-term exposure**

manganese dioxide

ON CONTINUOUS/REPEATED EXPOSURE/CONTACT: Feeling of weakness. Loss of appetite. Loss of weight. Sleeplessness. Brain affection. Behavioural disturbances. Delusions. Disturbed tactile sensibility. Movement disturbances. Coordination disorders. Disturbed motor response. Tremor. Coughing. Respiratory difficulties. Risk of pneumonia. Change in the haemogramme/blood composition. Impairment of the blood forming system. Possible premature birth. Discolouration of the gums.

### 11.2. Information on other hazards

No evidence of endocrine disrupting properties

## SECTION 12: Ecological information

### 12.1. Toxicity

manganese dioxide

| | Parameter | Method | Value | Duration | Species | Test design | Fresh/salt water | Value determination |
|---|---|---|---|---|---|---|---|---|
| Acute toxicity crustacea | LC50 | US EPA | 73.56 µg/l | 48 h | Ceriodaphnia dubia | Semi-static system | Fresh water | Read-across |
| Long-term toxicity fish | EC10 | | 17.8 µg/l | 7 day(s) | Cyprinus carpio | Flow-through system | Fresh water | Read-across |

Classification is based on the relevant ingredients

zinc oxide

| | Parameter | Method | Value | Duration | Species | Test design | Fresh/salt water | Value determination |
|---|---|---|---|---|---|---|---|---|
| Acute toxicity fishes | LC50 | | 1.55 mg/l | 96 h | Danio rerio | Static system | Fresh water | Experimental value; Lethal |
| Acute toxicity crustacea | EC50 | OECD 202 | 1 mg/l | 48 h | Daphnia magna | Static system | Fresh water | Experimental value; Zinc ion |
| Toxicity algae and other aquatic plants | IC50 | OECD 201 | 0.136 mg/l | 72 h | Pseudokirchneriella subcapitata | Static system | Fresh water | Experimental value; Growth rate |
| | NOEC | OECD 201 | 0.024 mg/l | 72 h | Pseudokirchneriella subcapitata | Static system | Fresh water | Experimental value; Growth rate |
| Long-term toxicity fish | NOEC | OECD 215 | 0.039 mg/l - 0.974 mg/l | 30 day(s) | Oncorhynchus mykiss | Flow-through system | Fresh water | Read-across; Lethal |
| Long-term toxicity aquatic crustacea | NOEC | OECD 211 | 0.04 mg/l | 21 day(s) | Daphnia magna | Semi-static system | Fresh water | Read-across; Reproduction |
| Toxicity aquatic micro-organisms | EC50 | OECD 209 | > 1000 mg/l | 3 h | Activated sludge | Static system | Fresh water | Experimental value; Respiration |

lead(II)sulphate

| | Parameter | Method | Value | Duration | Species | Test design | Fresh/salt water | Value determination |
|---|---|---|---|---|---|---|---|---|
| Acute toxicity fishes | TLm | | 7.48 mg/l | 96 h | Pimephales promelas | | | Literature study; Lead ion |
| Acute toxicity crustacea | LC50 | | 0.3 mg/l | 48 h | Daphnia magna | | | Literature study; Lead ion |
| Toxicity algae and other aquatic plants | EC50 | | 0.14 mg/l | | Selenastrum capricornutum | | | Literature study; Lead ion |

manganese dioxide

| | Parameter | Method | Value | Duration | Species | Test design | Fresh/salt water | Value determination |
|---|---|---|---|---|---|---|---|---|
| Acute toxicity fishes | LC50 | OECD 203 | > 100 % | 96 h | Oncorhynchus mykiss | Semi-static system | Fresh water | Experimental value; Saturated solution |
| Acute toxicity crustacea | EC50 | OECD 202 | > 0.073 mg/l | 48 h | Daphnia magna | Static system | Fresh water | Experimental value; GLP |
| Toxicity algae and other aquatic plants | ErC50 | OECD 201 | > 100 % | 72 h | Desmodesmus subspicatus | Static system | Fresh water | Experimental value; Saturated solution |
| Long-term toxicity fish | | | | | | | | Data waiving |
| Long-term toxicity aquatic crustacea | NOEC | OECD 211 | 10 % | 8 day(s) | Ceriodaphnia dubia | Static system | Fresh water | Experimental value; Saturated solution |
| Toxicity aquatic micro-organisms | EC50 | OECD 209 | > 1000 mg/l | 3 h | Activated sludge | Static system | Fresh water | Experimental value; GLP |
| Toxicity sediment organisms | | | | | | | | Data waiving |

| | Parameter | Method | Value | Duration | Species | Value determination |
|---|---|---|---|---|---|---|
| Toxicity soil macro-organisms | | | | | | Data waiving |
| Toxicity soil micro-organisms | | | | | | Data waiving |
| Toxicity terrestrial plants | | | | | | Data waiving |
| Toxicity other terrestrial organisms | | | | | | Data waiving |
| Toxicity birds | | | | | | Data waiving |

calcium sulfate

| | Parameter | Method | Value | Duration | Species | Test design | Fresh/salt water | Value determination |
|---|---|---|---|---|---|---|---|---|
| Acute toxicity fishes | LC50 | OECD 203 | > 79 mg/l | 96 h | Oryzias latipes | | Fresh water | Experimental value; Nominal concentration |
| Acute toxicity crustacea | LC50 | OECD 202 | > 79 mg/l | 48 h | Daphnia magna | | Fresh water | Experimental value; GLP |
| Toxicity algae and other aquatic plants | EC50 | OECD 201 | | 72 h | Pseudokirchneriella subcapitata | | | Experimental value; Greater than the water solubility |
| | NOEC | OECD 201 | 2.1 g/l | 72 h | Pseudokirchneriella subcapitata | | | Experimental value; Greater than the water solubility |
| Toxicity aquatic micro-organisms | EC50 | OECD 209 | > 1000 mg/l | 3 h | Activated sludge | | | Experimental value; Nominal concentration |
| | NOEC | OECD 209 | 1000 mg/l | 3 h | Activated sludge | | | Experimental value; Nominal concentration |

**Conclusion**

Very toxic to aquatic life with long lasting effects.

## 12.2. Persistence and degradability

manganese dioxide

**Biodegradation water**

| Method | Value | Duration | Value determination |
|---|---|---|---|
| | | | Data waiving |

**Conclusion**

**Water**

Biodegradability: not applicable

## 12.3. Bioaccumulative potential

manganese dioxide

**Log Kow**

| Method | Remark | Value | Temperature | Value determination |
|---|---|---|---|---|
| | Not applicable | | | |

zinc oxide

**BCF fishes**

| Parameter | Method | Value | Duration | Species | Value determination |
|---|---|---|---|---|---|
| BCF | | 78 - 2060 | 14 day(s) | Oncorhynchus mykiss | Experimental value |

**Log Kow**

| Method | Remark | Value | Temperature | Value determination |
|---|---|---|---|---|
| | | 1.53 | | Estimated value |

lead(II)sulphate

**Log Kow**

| Method | Remark | Value | Temperature | Value determination |
|---|---|---|---|---|
| | | 1.13 | | Estimated value |

manganese dioxide

**BCF other aquatic organisms**

| Parameter | Method | Value | Duration | Species | Value determination |
|---|---|---|---|---|---|
| | | | | | Data waiving |

**Log Kow**

| Method | Remark | Value | Temperature | Value determination |
|---|---|---|---|---|
| | No data available | | | |

calcium sulfate

**Log Kow**

| Method | Remark | Value | Temperature | Value determination |
|---|---|---|---|---|
| | Not applicable (inorganic) | | | |

strontium sulphate

**Log Kow**

| Method | Remark | Value | Temperature | Value determination |
|---|---|---|---|---|
| | No data available | | | |

**Conclusion**

No straightforward conclusion can be drawn based upon the available numerical values

## 12.4. Mobility in soil

zinc oxide

**(log) Koc**

| Parameter | Method | Value | Value determination |
|---|---|---|---|
| log Koc | | 2.2 | Literature study |

**Conclusion**

Contains component(s) that adsorb(s) into the soil

Contains component(s) with potential for mobility in the soil

## 12.5. Results of PBT and vPvB assessment

The criteria of PBT and vPvB as listed in Annex XIII of Regulation (EC) No 1907/2006 do not apply to inorganic substances.

## 12.6. Endocrine disrupting properties

No evidence of endocrine disrupting properties

## 12.7. Other adverse effects

manganese dioxide

**Greenhouse gases**

Not included in the list of fluorinated greenhouse gases (Regulation (EU) No 517/2014)

**Ozone-depleting potential (ODP)**

Not classified as dangerous for the ozone layer (Regulation (EC) No 1005/2009)

zinc oxide

**Groundwater**

Groundwater pollutant

## SECTION 13: Disposal considerations

The information in this section is a general description. If available, the documentation for isolated intermediates will be attached in annex to support safe handling arrangements.

### 13.1. Waste treatment methods

**13.1.1 Provisions relating to waste**

**European Union**

Hazardous waste according to Directive 2008/98/EC, as amended by Regulation (EU) No 1357/2014 and Regulation (EU) No 2017/997.
Waste material code (Directive 2008/98/EC, Decision 2000/0532/EC).
06 03 13* (wastes from the MFSU of salts and their solutions and metallic oxides: solid salts and solutions containing heavy metals).
Depending on branch of industry and production process, also other waste codes may be applicable.

**13.1.2 Disposal methods**

Recycle/reuse. Remove waste in accordance with local and/or national regulations. Hazardous waste shall not be mixed together with other waste. Different types of hazardous waste shall not be mixed together if this may entail a risk of pollution or create problems for the further management of the waste. Hazardous waste shall be managed responsibly. All entities that store, transport or handle hazardous waste shall take the necessary measures to prevent risks of pollution or damage to people or animals. Do not discharge into surface water (Directive 2000/60/EC, Council Decision 2455/2001/EC). Treat using the best available techniques before discharge into drains or the aquatic environment.

**13.1.3 Packaging/Container**

**European Union**

Waste material code packaging (Directive 2008/98/EC).
15 01 10* (packaging containing residues of or contaminated by dangerous substances).

## SECTION 14: Transport information

### Road (ADR)

14.1. UN number

| | |
|---|---|
| UN number | 3077 |

14.2. UN proper shipping name

| | |
|---|---|
| Proper shipping name | environmentally hazardous substance, solid, n.o.s. (lead(II) sulphate) |

14.3. Transport hazard class(es)

| | |
|---|---|
| Hazard identification number | 90 |
| Class | 9 |
| Classification code | M7 |

14.4. Packing group

| | |
|---|---|
| Packing group | III |
| Labels |  9 |

14.5. Environmental hazards

| | |
|---|---|
| Environmentally hazardous substance mark |  yes |

14.6. Special precautions for user

| | |
|---|---|
| Special provisions | 274 |
| Special provisions | 335 |
| Special provisions | 375 |
| Special provisions | 601 |
| Limited quantities | Combination packagings: not more than 5 kg per inner packaging for solids. A package shall not weigh more than 30 kg. (gross mass) |

### Rail (RID)

14.1. UN number

| | |
|---|---|
| UN number | 3077 |

14.2. UN proper shipping name

| | |
|---|---|
| Proper shipping name | environmentally hazardous substance, solid, n.o.s. (lead(II) sulphate) |

14.3. Transport hazard class(es)

| | |
|---|---|
| Hazard identification number | 90 |
| Class | 9 |

| | |
|---|---|
| Classification code | M7 |

14.4. Packing group

| | |
|---|---|
| Packing group | III |
| Labels |  9 |

14.5. Environmental hazards

| | |
|---|---|
| Environmentally hazardous substance mark |  yes |

14.6. Special precautions for user

| | |
|---|---|
| Special provisions | 274 |
| Special provisions | 335 |
| Special provisions | 375 |
| Special provisions | 601 |
| Limited quantities | Combination packagings: not more than 5 kg per inner packaging for solids. A package shall not weigh more than 30 kg. (gross mass) |

## Inland waterways (ADN)

14.1. UN number

| | |
|---|---|
| UN number | 3077 |

14.2. UN proper shipping name

| | |
|---|---|
| Proper shipping name | environmentally hazardous substance, solid, n.o.s. (lead(II) sulphate) |

14.3. Transport hazard class(es)

| | |
|---|---|
| Class | 9 |
| Classification code | M7 |

14.4. Packing group

| | |
|---|---|
| Packing group | III |
| Labels |  9 |

14.5. Environmental hazards

| | |
|---|---|
| Environmentally hazardous substance mark |  yes |

14.6. Special precautions for user

| | |
|---|---|
| Special provisions | 274 |
| Special provisions | 335 |
| Special provisions | 375 |
| Special provisions | 601 |
| Limited quantities | Combination packagings: not more than 5 kg per inner packaging for solids. A package shall not weigh more than 30 kg. (gross mass) |

## Sea (IMDG/IMSBC)

14.1. UN number

| | |
|---|---|
| UN number | 3077 |

14.2. UN proper shipping name

| | |
|---|---|
| Proper shipping name | environmentally hazardous substance, solid, n.o.s. (lead(II) sulphate) |

14.3. Transport hazard class(es)

| | |
|---|---|
| Class | 9 |

14.4. Packing group

| | |
|---|---|
| Packing group | III |
| Labels |  9 |

14.5. Environmental hazards

| | |
|---|---|
| Marine pollutant | P |
| Environmentally hazardous substance mark |  yes |

14.6. Special precautions for user

| | |
|---|---|
| Special provisions | 274 |
| Special provisions | 335 |
| Special provisions | 966 |
| Special provisions | 967 |
| Special provisions | 969 |
| Limited quantities | Combination packagings: not more than 5 kg per inner packaging for solids. A package shall not weigh more than 30 kg. (gross mass) |

14.7. Maritime transport in bulk according to IMO instruments

| | |
|---|---|
| Annex II of MARPOL 73/78 | Not applicable |

### Air (ICAO-TI/IATA-DGR)

14.1. UN number

| | |
|---|---|
| UN number | 3077 |

14.2. UN proper shipping name

| | |
|---|---|
| Proper shipping name | environmentally hazardous substance, solid, n.o.s. (lead(II) sulphate) |

14.3. Transport hazard class(es)

| | |
|---|---|
| Class | 9 |

14.4. Packing group

| | |
|---|---|
| Packing group | III |
| Labels |  9 |

14.5. Environmental hazards

| | |
|---|---|
| Environmentally hazardous substance mark |  yes |

14.6. Special precautions for user

| | |
|---|---|
| Special provisions | A158 |
| Special provisions | A179 |
| Special provisions | A197 |
| Special provisions | A215 |
| Special provisions | A97 |

Passenger and cargo transport

| | |
|---|---|
| Limited quantities: maximum net quantity per packaging | 30 kg G |

## SECTION 15: Regulatory information

### 15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

**European legislation:**

VOC content Directive 2010/75/EU

| VOC content | Remark |
|---|---|
| | Not applicable (inorganic) |

Prior informed consent (PIC)

Contains component(s) listed in Annex I of Regulation (EU) No 649/2012: Part 1 - List of chemicals subject to export notification procedure

European drinking water standards (98/83/EC and 2020/2184)

lead(II)sulphate

| Parameter | Parametric value | Note | Reference |
|---|---|---|---|
| Lead | 5 µg/l | | Listed in Annex I, Part B, of Directive (EU) 2020/2184 on the quality of water intended for human consumption. |
| Sulphate | 250 mg/l | | Listed in Annex I, Part C, of Directive (EU) 2020/2184 on the quality of water intended for human consumption. |
| Lead | 10 µg/l | | Listed in Annex I, Part D, of Directive (EU) 2020/2184 on the quality of water intended for human consumption. |

calcium sulfate

| Parameter | Parametric value | Note | Reference |
|---|---|---|---|
| Sulphate | 250 mg/l | | Listed in Annex I, Part C, of Directive (EU) 2020/2184 on the quality of water intended for human consumption. |

REACH registration

This substance is handled under Strictly Controlled Conditions in accordance with Reach regulation Article 17(3) for on-site isolated intermediates and, in case the substance is transported to other sites for further processing, the substance should be handled at these sites under Strictly Controlled Conditions as specified in Reach regulation Article 18(4). Site documentation to support safe handling arrangements including the selection of engineering, administrative and personal protective equipment controls in accordance with risk based management systems is available at each manufacturing site. Written confirmation of application of Strictly Controlled Conditions should be available at the premises of every affected Distributor and Downstream Processor/User of the Registrants' intermediate.

Information exposure scenarios

This safety data sheet does not contain an exposure scenario; exempted as (isolated) intermediate

REACH Annex XVII - Restriction

Contains component(s) subject to restrictions of Annex XVII of Regulation (EC) No 1907/2006: restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles.

| | Designation of the substance, of the group of substances or of the mixture | Conditions of restriction |
|---|---|---|
| · lead(II)sulphate | Lead sulphates; PbSO 4 | Shall not be placed on the market, or used, as substances or in mixtures, where the substance or mixture is intended for use as paint. However, Member States may, in accordance with the provisions of International Labour Organization (ILO) Convention 13, permit the use on their territory of the substance or mixture for the restoration and maintenance of works of art and historic buildings and their interiors, as well as the placing on the market for such use. Where a Member State makes use of this derogation, it shall inform the Commission thereof. |
| · lead(II)sulphate | Substances which are classified as reproductive toxicant category 1A or 1B in Part 3 of Annex VI to Regulation (EC) No 1272/2008 and are listed in Appendix 5 or Appendix 6, respectively. | Without prejudice to the other parts of this Annex the following shall apply to entries 28 to 30:<br>1. Shall not be placed on the market, or used,<br>— as substances,<br>— as constituents of other substances, or,<br>— in mixtures,<br>for supply to the general public when the individual concentration in the substance or mixture is equal to or greater than:<br>— either the relevant specific concentration limit specified in Part 3 of Annex VI to Regulation (EC) No 1272/2008, or,<br>— the relevant generic concentration limit specified in Part 3 of Annex I of Regulation (EC) No 1272/2008.<br>Without prejudice to the implementation of other Community provisions relating to the classification, packaging and labelling of substances and mixtures, suppliers shall ensure before the placing on the market that the packaging of such substances and mixtures is marked visibly, legibly and indelibly as follows: "Restricted to professional users".<br>2. By way of derogation, paragraph 1 shall not apply to:<br>(a) medicinal or veterinary products as defined by Directive 2001/82/EC and Directive 2001/83/EC;<br>(b) cosmetic products as defined by Directive 76/768/EEC;<br>(c) the following fuels and oil products:<br>— motor fuels which are covered by Directive 98/70/EC,<br>— mineral oil products intended for use as fuel in mobile or fixed combustion plants,<br>— fuels sold in closed systems (e.g. liquid gas bottles);<br>(d) artists' paints covered by Regulation (EC) No 1272/2008;<br>(e) the substances listed in Appendix 11, column 1, for the applications or uses listed in Appendix 11, column 2. Where a date is specified in column 2 of Appendix 11, the derogation shall apply until the said date;<br>(f) devices covered by Regulation (EU) 2017/745. |
| · lead(II)sulphate | Lead and its compounds | 1. Shall not be placed on the market or used in any individual part of jewellery articles if the concentration of lead (expressed as metal) in such a part is equal to or greater than 0,05 % by weight.<br>2. For the purposes of paragraph 1:<br>(i) "jewellery articles" shall include jewellery and imitation jewellery articles and hair accessories, including:<br>(a) bracelets, necklaces and rings;<br>(b) piercing jewellery;<br>(c) wrist watches and wrist-wear;<br>(d) brooches and cufflinks;<br>(ii) "any individual part" shall include the materials from which the jewellery is made, as well as the individual components of the jewellery articles.<br>3. Paragraph 1 shall also apply to individual parts when placed on the market or used for jewellery-making.<br>4. By way of derogation, paragraph 1 shall not apply to:<br>(a) crystal glass as defined in Annex I (categories 1, 2, 3 and 4) to Council Directive 69/493/EEC (*);<br>(b) internal components of watch timepieces inaccessible to consumers;<br>(c) non-synthetic or reconstructed precious and semiprecious stones (CN code 7103, as established by Regulation (EEC) No 2658/87), unless they have been treated with lead or its compounds or mixtures containing these substances;<br>(d) enamels, defined as vitrifiable mixtures resulting from the fusion, vitrification or sintering of minerals melted at a temperature of at least 500 °C. (*) OJ L 326, 29.12.1969, p. 36.<br>5. By way of derogation, paragraph 1 shall not apply to jewellery articles placed on the |

| | | | |
|---|---|---|---|
| | | | market for the first time before 9 October 2013 and jewellery articles produced before 10 December 1961.<br>6. By 9 October 2017, the Commission shall re-evaluate paragraphs 1 to 5 of this entry in the light of new scientific information, including the availability of alternatives and the migration of lead from the articles referred to in paragraph 1 and, if appropriate, modify this entry accordingly.<br>7. Shall not be placed on the market or used in articles supplied to the general public, if the concentration of lead (expressed as metal) in those articles or accessible parts thereof is equal to or greater than 0,05 % by weight, and those articles or accessible parts thereof may, during normal or reasonably foreseeable conditions of use, be placed in the mouth by children.<br>That limit shall not apply where it can be demonstrated that the rate of lead release from such an article or any such accessible part of an article, whether coated or uncoated, does not exceed 0,05 µg/cm2 per hour (equivalent to 0,05 µg/g/h), and, for coated articles, that the coating is sufficient to ensure that this release rate is not exceeded for a period of at least two years of normal or reasonably foreseeable conditions of use of the article.<br>For the purposes of this paragraph, it is considered that an article or accessible part of an article may be placed in the mouth by children if it is smaller than 5 cm in one dimension or has a detachable or protruding part of that size.<br>8. By way of derogation, paragraph 7 shall not apply to:<br>(a) jewellery articles covered by paragraph 1;<br>(b) crystal glass as defined in Annex I (categories 1, 2, 3 and 4) to Directive 69/493/EEC;<br>(c) non-synthetic or reconstructed precious and semi-precious stones (CN code 7103 as established by Regulation (EEC) No 2658/87) unless they have been treated with lead or its compounds or mixtures containing these substances;<br>(d) enamels, defined as vitrifiable mixtures resulting from the fusion, vitrification or sintering of mineral melted at a temperature of at least 500 °C;<br>(e) keys and locks, including padlocks;<br>(f) musical instruments;<br>(g) articles and parts of articles comprising brass alloys, if the concentration of lead (expressed as metal) in the brass alloy does not exceed 0,5 % by weight;<br>(h) the tips of writing instruments;<br>(i) religious articles;<br>(j) portable zinc-carbon batteries and button cell batteries;<br>(k) articles within the scope of:<br>(i) Directive 94/62/EC;<br>(ii) Regulation (EC) No 1935/2004;<br>(iii) Directive 2009/48/EC of the European Parliament and of the Council (*);<br>(iv) Directive 2011/65/EU of the European Parliament and of the Council (**)<br>9. By 1 July 2019, the Commission shall re-evaluate paragraphs 7 and 8(e), (f), (i) and (j) of this entry in the light of new scientific information, including the availability of alternatives and the migration of lead from the articles referred to in paragraph 7, including the requirement on coating integrity, and, if appropriate, modify this entry accordingly.<br>10. By way of derogation paragraph 7 shall not apply to articles placed on the market for the first time before 1 June 2016.<br>(*) Directive 2009/48/EC of the European Parliament and of the Council of 18 June 2009 on the safety of toys (OJ L 170, 30.6.2009, p. 1).<br>(**) Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (OJ L 174, 1.7.2011, p. 88).<br>11. Doing either of the following acts after 15 February 2023 in or within 100 metres of wetlands is prohibited:<br>(a) discharging gunshot containing a concentration of lead (expressed as metal) equal to or greater than 1 % by weight;<br>(b) carrying any such gunshot where this occurs while out wetland shooting or as part of going wetland shooting.<br>For the purposes of the first subparagraph:<br>(a) “within 100 metres of wetlands” means within 100 metres outward from any outer boundary point of a wetland;<br>(b) “wetland shooting” means shooting in or within 100 metres of wetlands;<br>(c) if a person is found carrying gunshot in or within 100 metres of wetlands while out shooting or as part of going shooting, the shooting concerned shall be presumed to be wetland shooting unless that person can demonstrate that it was some other type of shooting.<br>The restriction laid down in the first subparagraph shall not apply in a Member State if that Member State notifies the Commission in accordance with paragraph 12 that it intends to make use of the option granted by that paragraph.<br>12. If at least 20 % in total of the territory, excluding the territorial waters, of a Member State are wetlands, that Member State may, in place of the restriction laid down in the first subparagraph of paragraph 11, prohibit the following acts throughout the whole of its territory from 15 February 2024:<br>(a) the placing on the market of gunshot containing a concentration of lead (expressed as metal) equal to or greater than 1 % by weight;<br>(b) the discharging of any such gunshot;<br>(c) carrying any such gunshot while out shooting or as part of going shooting.<br>Any Member State intending to make use of the option granted by the first subparagraph shall notify the Commission of this intention by 15 August 2021. The Member State shall communicate the text of the national measures adopted by it to the Commission without delay and in any event by 15 August 2023. The Commission shall make publicly available without delay any such notices of intention and texts of national measures received by it.<br>13. For the purposes of paragraphs 11 and 12:<br>(a) “wetlands” means areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, |

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| | | including areas of marine water the depth of which at low tide does not exceed 6 metres;<br>(b) “gunshot” means pellets used or intended for use in a single charge or cartridge in a shotgun;<br>(c) “shotgun” means a smooth-bore gun, excluding airguns;<br>(d) “shooting” means any shooting with a shotgun;<br>(e) “carrying” means any carrying on the person or carrying or transporting by any other means;<br>(f) in determining whether a person found with gunshot is carrying gunshot “as part of going shooting”:<br>(i) regard shall be had to all the circumstances of the case;<br>(ii) the person found with the gunshot need not necessarily be the same person as the person shooting.<br>14. Member States may maintain national provisions for protection of the environment or human health in force on 15 February 2021 and restricting lead in gunshot more severely than provided for in paragraph 11.<br>The Member State shall communicate the text of those national provisions to the Commission without delay. The Commission shall make publicly available without delay any such texts of national provisions received by it. |
| · lead(II)sulphate | The substances listed in column 1 of the Table in Appendix 12 | 1. Shall not be placed on the market after 1 November 2020 in any of the following:<br>(a) clothing or related accessories;<br>(b) textiles other than clothing which, under normal or reasonably foreseeable conditions of use, come into contact with human skin to an extent similar to clothing;<br>(c) footwear;<br>if the clothing, related accessory, textile other than clothing or footwear is for use by consumers and the substance is present in a concentration, measured in homogeneous material, equal to or greater than that specified for that substance in Appendix 12.<br>2. By way of derogation, in relation to the placing on the market of formaldehyde [CAS No 50-00-0] in jackets, coats or upholstery, the relevant concentration for the purposes of paragraph 1 shall be 300 mg/kg during the period between 1 November 2020 and 1 November 2023. The concentration specified in Appendix 12 shall apply thereafter.<br>3. Paragraph 1 shall not apply to:<br>(a) clothing, related accessories or footwear, or parts of clothing, related accessories or footwear, made exclusively of natural leather, fur or hide;<br>(b) non-textile fasteners and non-textile decorative attachments;<br>(c) second-hand clothing, related accessories, textiles other than clothing or footwear<br>(d) wall-to-wall carpets and textile floor coverings for indoor use, rugs and runners.<br>4. Paragraph 1 shall not apply to clothing, related accessories, textiles other than clothing, or footwear within the scope of Regulation (EU) 2016/425 of the European Parliament and of the Council (*) or Regulation (EU) 2017/745 of the European Parliament and of the Council (**).<br>5. Paragraph 1(b) shall not apply to disposable textiles. ‘Disposable textiles’ means textiles that are designed to be used only once or for a limited time and are not intended for subsequent use for the same or a similar purpose.<br>6. Paragraphs 1 and 2 shall apply without prejudice to the application of any stricter restrictions set out in this Annex or in other applicable Union legislation.<br>7. The Commission shall review the exemption in paragraph 3(d) and, if appropriate, modify that point accordingly.<br>(*) Regulation (EU) 2016/425 of the European Parliament and of the Council of of 9 March 2016 on personal protective equipment and repealing Council Directive 89/686/EEC (OJ L 81, 31.3.2016, p. 51).<br>(**) Regulation (EU) 2017/745 of the European Parliament and of the Council of 5 April 2017 on medical devices, amending Directive 2001/83/EC, Regulation (EC) No 178/2002 and Regulation (EC) No 1223/2009 and repealing Council Directives 90/385/EEC and 93/42/EEC (OJ L 117, 5.5.2017, p. 1). |

**National legislation Belgium**

manganese dioxide

No data available

**National legislation The Netherlands**

manganese dioxide

| | |
|---|---|
| Waterbezwaarlijkheid | Z (2); Algemene Beoordelingsmethodiek (ABM) |

lead(II)sulphate

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|---|---|
| SZW - Lijst van voor de voortplanting giftige stoffen (ontwikkeling) | loodverbindingen, alle; Opgenomen in SZW-lijst van voor de voortplanting giftige stoffen (ontwikkeling); 1A |
| SZW - Lijst van voor de voortplanting giftige stoffen (vruchtbaarheid) | loodverbindingen, alle; Opgenomen in SZW-lijst van voor de voortplanting giftige stoffen (vruchtbaarheid); 2 |

manganese dioxide

| | |
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| SZW - Lijst van voor de voortplanting giftige stoffen (ontwikkeling) | Mangaan en -verbindingen; Opgenomen in SZW-lijst van voor de voortplanting giftige stoffen (ontwikkeling); 2 |
| SZW - Lijst van voor de voortplanting giftige stoffen (vruchtbaarheid) | Mangaan en -verbindingen; Opgenomen in SZW-lijst van voor de voortplanting giftige stoffen (vruchtbaarheid); 2 |

**National legislation France**

manganese dioxide

No data available

lead(II)sulphate

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|---|---|
| Catégorie cancérogène | Plomb métallique et composés, en Pb |
| Catégorie toxique pour la reproduction | Plomb métallique et composés, en Pb |

**National legislation Germany**

manganese dioxide

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|---|---|
| WGK | 3; Classification water polluting based on the components in compliance with Verwaltungsvorschrift wassergefährdender Stoffe (VwVwS) of 27 July 2005 (Anhang 4) |

zinc oxide

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| TA-Luft | 5.2.1 |

lead(II)sulphate

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|---|---|
| TA-Luft | 5.2.2/II |

manganese dioxide

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| TA-Luft | 5.2.2/III |
| TRGS900 - Risiko der Fruchtschädigung | Mangan und seine anorganischen Verbindungen; Y; Risiko der Fruchtschädigung braucht bei Einhaltung des Arbeitsplatzgrenzwertes und des biologischen Grenzwertes nicht befürchtet zu werden |
| | Mangan und seine anorganischen Verbindungen; Y; Risiko der Fruchtschädigung braucht bei Einhaltung des Arbeitsplatzgrenzwertes und des biologischen Grenzwertes nicht befürchtet zu werden |

calcium sulfate

| | |
|---|---|
| TA-Luft | 5.2.1 |

**National legislation Austria**

manganese dioxide

No data available

**National legislation United Kingdom**

manganese dioxide

No data available

**Other relevant data**

manganese dioxide

No data available

lead(II)sulphate

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|---|---|
| TLV - Carcinogen | Lead and inorganic compounds, as Pb; A3 |

manganese dioxide

| | |
|---|---|
| TLV - Carcinogen | Manganese, elemental and inorganic compounds, as Mn; A4 |
| | Manganese, elemental and inorganic compounds, as Mn; A4 |

### 15.2. Chemical safety assessment

No chemical safety assessment is required; registered as an isolated intermediate.

## SECTION 16: Other information

**Full text of any H- and EUH-statements referred to under section 3:**

H302 Harmful if swallowed.
H332 Harmful if inhaled.
H351 Suspected of causing cancer.
H360 May damage fertility or the unborn child.
H360Df May damage the unborn child. Suspected of damaging fertility.
H372 Causes damage to organs (central nervous system, reproductive organs) through prolonged or repeated exposure if swallowed.
H373 May cause damage to organs (brain) through prolonged or repeated exposure if inhaled.
H373 May cause damage to organs through prolonged or repeated exposure.
H400 Very toxic to aquatic life.
H410 Very toxic to aquatic life with long lasting effects.

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| (*) | INTERNAL CLASSIFICATION BY BIG |
| ADI | Acceptable daily intake |
| AOEL | Acceptable operator exposure level |
| ATE | Acute Toxicity Estimate |
| CLP (EU-GHS) | Classification, labelling and packaging (Globally Harmonised System in Europe) |
| DMEL | Derived Minimal Effect Level |
| DNEL | Derived No Effect Level |
| EC50 | Effect Concentration 50 % |
| ErC50 | EC50 in terms of reduction of growth rate |
| LC50 | Lethal Concentration 50 % |
| LD50 | Lethal Dose 50 % |
| NOAEL | No Observed Adverse Effect Level |
| NOEC | No Observed Effect Concentration |
| OECD | Organisation for Economic Co-operation and Development |
| PBT | Persistent, Bioaccumulative & Toxic |
| PNEC | Predicted No Effect Concentration |
| STP | Sludge Treatment Process |
| vPvB | very Persistent & very Bioaccumulative |

The information in this safety data sheet is based on data and samples provided to BIG. The sheet was written to the best of our ability and according to the state of knowledge at that time. The safety data sheet only constitutes a guideline for the safe handling, use, consumption, storage, transport and disposal of the substances/preparations/mixtures mentioned under point 1. New safety data sheets are written from time to time. Only the most recent versions may be used. Unless indicated otherwise word for word on the safety data sheet, the information does not apply to substances/preparations/mixtures in purer form, mixed with other substances or in processes. The safety data sheet offers no quality specification for the substances/preparations/mixtures in question. Compliance with the instructions in this safety data sheet does not release the user from the obligation to take all measures dictated by common sense, regulations and recommendations or which are necessary and/or useful based on the real applicable circumstances. BIG does not guarantee the accuracy or exhaustiveness of the information provided and cannot be held liable for any changes by third parties. This safety data sheet is only to be used within the European Union, Switzerland, Iceland, Norway and Liechtenstein. Any use outside of this area is at your own risk. Use of this safety data sheet is subject to the licence and liability limiting conditions as stated in your BIG licence agreement or when this is failing the general conditions of BIG. All intellectual property rights to this sheet are the property of BIG and its distribution and reproduction are limited. Consult the mentioned agreement/conditions for details.

# Annex to the Safety Data Sheet
## Slimes and Sludges, zinc sulfate electrolytic (273-742-8)

This annex contains information on risk management measures as specified in appendix 3 of the registration dossier for isolated on-site and transported intermediates

## 1. Brief description of technological process applied in manufacture of the intermediate EC 273-742-8

- During the Zinc electrolysis, insoluble oxy-sulphates, (i.e. Lead- & calcium-sulphate and Manganese di-oxide) can be formed at the Lead-anode surface ; part of it falls down in the cells another part sticks to the Lead-anode surface and is separated during the anode-cleaning steps
- The Pb-Mn cellmud is regularly collected from the bottom of the cells and from the anode-cleaning devices. It is settled, washed and filtered.
- Transfer of the Pb-Mn cellmud occurs in big-bags or containers or covered bulk load trucks, according to applicable regulation
- The 'Pb Mn cellmud' is a lumpy wet filtercake with an average Lead-content of 20-30% w/w and is typically used in production units of Lead metal (EC 231-100-4) or Lead compounds and recovery of precious metals
- Waste of the process:
    - None

## 2. Brief description of technological processes applied in use of the intermediate EC 273-742-8

- The 'Pb Mn cellmud' is unloaded from transport trucks, ADR-big-bags or containers, …and transferred to storage silo's through especially designed transfer units,
- The 'Pb Mn cellmud' is optionally blended with other Lead-containing primary or secondary materials
- The mixture is continuously fed to smelting furnaces (i.e. ISA, Blast furnace, ISF ...) or similar for further smelting extraction of lead and lead compounds, and precious metals
- Waste treatment:
    - None
    - During pyrometallurgical treatment: slag. The slag is dumped if not re-used in road filling.

## 3. Means of rigorous containment and minimisation technologies applied by the registrant during the manufacturing and /or use process

### ⇨ Description of the technical means to rigorously contain the substance

- Process enclosures and closed circuits where relevant and possible
- Containment of liquid volumes in sumps to collect/prevent accidental spillage, acid solutions are treated adequately
- Potential dryers are operated under strong aspiration (negative pressure towards atmospheric pressure)
- All processes are performed in a confined area
- The process is managed and controlled from a separate control-room.

### ⇨ Identification of residual emissions to workplace & environment

Residual exposures at the workplace and the environment are assessed from regular measurements of dust/metals and represent usually a global exposure to several steps in a process. Dust control: dust and metals in dust needs to be measured in the workplace air (static or individual) according to national regulations.

- Workplaces: dust, metal concentrations?

  - Workers: biomonitoring – blood for Pb, twice a year if appropriate or according to regulation
  - Environment air: stack point source measurement (dust, metal concentrations)
  - Environment water: typically measured prior to discharge, if emissions to surface waters are relevant

- Some non-process waters can be generated containing Mn/Pb (e.g. from cleaning)

⇨ **Description of the procedural and control technologies to minimise emission and resulting exposure**

- The Pb Mn cellmud residue is kept moist, so dust formation/emission is by definition limited
- In the use phase, where it is dried, air emissions are controlled by use of air emission abatement devices e.g. filters, wet scrubbers. This may create a general negative pressure at the system openings (loading, sampling, production exit).
- regular sampling, cleaning, maintenance
- On-site waste water treatment techniques are applied to prevent releases to water (if applicable) e.g.: chemical precipitation, sedimentation and filtration.
- Local exhaust ventilation systems
- Special care for the general establishment and maintenance of a clean working environment by e.g.:
  - Cleaning of process equipment and workshop
  - Contained storage of leach residue in covered areas
- All residues formed during the leaching process (and gas-cleaning system at use site), are recovered and either recycled in the system or handled further according to waste legislation
- Wearing of gloves and protective clothing is compulsory
- With normal handling of the moist residue, no respiratory personal protection (breathing apparatus) is necessary.
- Eyes: safety glasses are recommended or compulsory

⇨ **Specification of management means and training that particularly contribute to the functioning of the technical means described above**

- integrated management system is implemented on the workplace e.g. ISO 9000, ISO ICS13100 series, ISO 1400X series, EMAS, or alike and, as usually applicable, by being IPPC-compliant (cf. NFM-BREF)
- housekeeping and hygiene procedures in place
- training provided for internal and external cleaning teams or technicians
- Follow up HS by medical unit: biomonitoring if required (e.g.. Pb, ...)

## 4. Means of rigorous containment and minimisation technologies recommended to the user of the intermediate

- Means of containment and minimisation technologies are same as above
- Blending, and optionally pelletizing, and furnaces are operated under strong aspiration (negative pressure towards atmospheric pressure)
- The zinc leach residue is unloaded from [pneumatic] transport trucks, train, ADR-big-bags or containers, …and transferred to storage zones or silo's through especially designed transfer units
- Material composition, handling, storage procedures and general guidance on safe use are communicated to the personnel or downstream (external) user by means of Safety Data Sheet

## 5. Special procedures applied before cleaning and maintenance

- Procedures are in place to ensure safe cleaning and maintenance operations
    - Stopping (part of) the process
    - Cooling down and proper ventilation of equipment
    - Switch off power supply & lock out procedure
    - Special PPE mandatory for cleaning personnel or maintenance technicians
    - Planning and training for internal and external personnel
- general guidance on safe use is communicated to the personnel or downstream (external) user by means of Safety Data Sheet

## 6. Describe activity and type of PPE in case of accidents, incidents, maintenance and cleaning activities

Accident release measures:

- **Workers**: Immediately contact emergency personnel. Keep unnecessary personnel away.
- Use suitable protective equipment.
- **Environment**: Avoid dispersal of spilled material and runoff and contact with soil, waterways,
- drains and sewers.
- **Cleaning**: If emergency personnel are unavailable, vacuum or carefully scoop up spilled
- material and place in an appropriate container for disposal by incineration. Avoid
- creating dusty conditions and prevent wind dispersal.

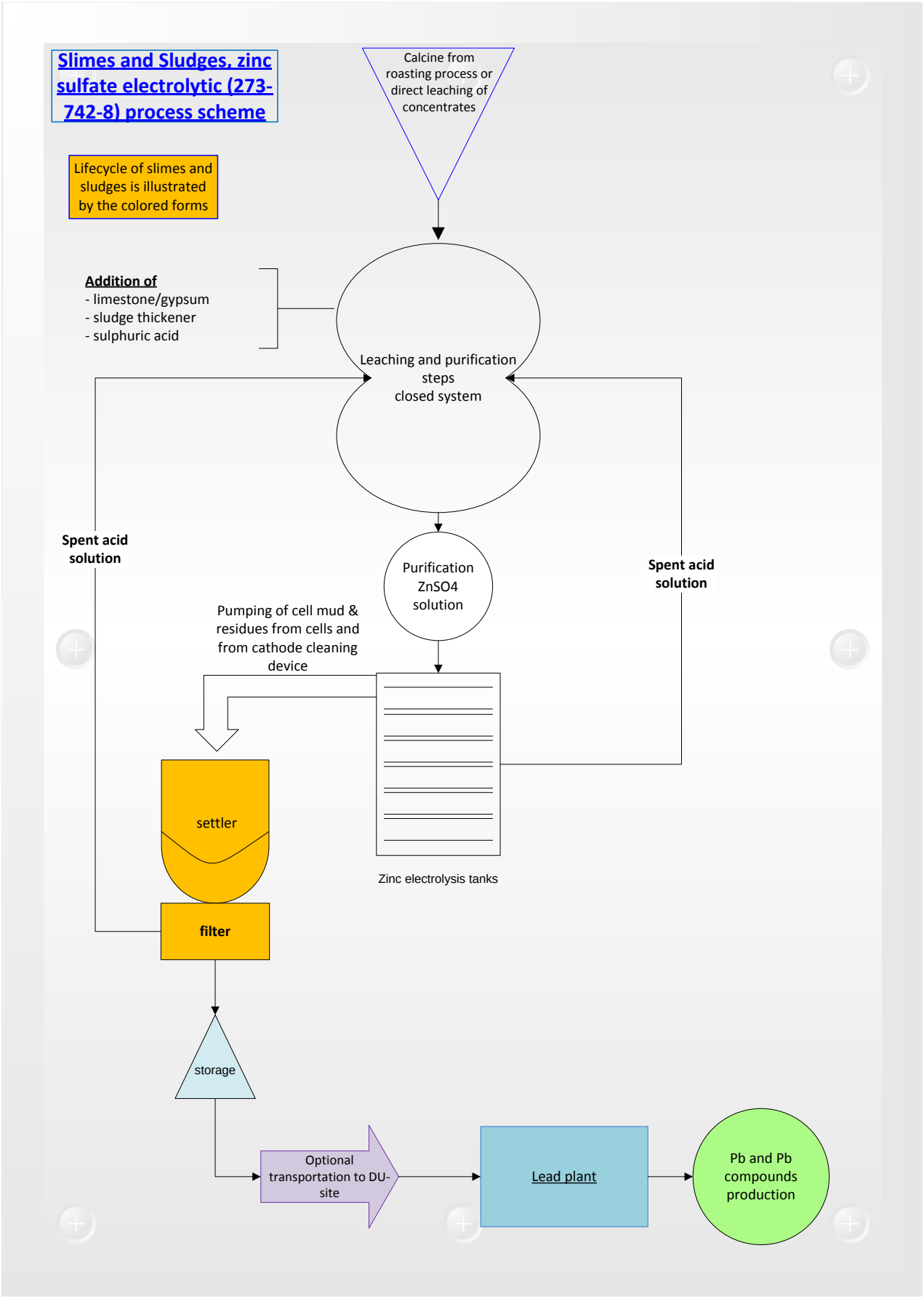
Fire: Use an extinguishing agent suitable for the surrounding fire. No specific hazard. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain. Thermal decomposition products are sulfur oxides (SO2, SO3 etc.) and some metallic oxides. Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.
Periodic maintenance: (Furnace and associated equipment if applicable, Off-gas treatment system, Repair operations, Observational tasks and control activities), the following measures are taken:

- General protective and hygiene measures: Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Separate storing of protective / work clothing is necessary. Avoid contact of spilled material and runoff with soil and surface waterways. Use process enclosures, local exhaust ventilation or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fumes or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.
- Respiratory protection: Use a properly fitted, particulate filter respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.
- Hand protection: Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Eye protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts.
- Body protection: Usual chemical work clothing.

- Cleaning activity : (Process equipment, workshop): same applies

## 7. Waste information

- The intermediate is a product for the production of zinc as a metal. If the normal processing route cannot be adhered to, returning it to the producer is recommended. Disposal should be in accordance with the official regulations (hazardous waste)
- PPE equipment is collected and disposed of
- Packaging?


Slimes and Sludges, zinc sulfate electrolytic (273-742-8) process scheme
Calcine from roasting process or direct leaching of concentrates
Lifecycle of slimes and sludges is illustrated by the colored forms
Addition of
- limestone/gypsum
- sludge thickener
- sulphuric acid
Leaching and purification steps closed system
Spent acid solution
Purification ZnSO4 solution
Spent acid solution
Pumping of cell mud & residues from cells and from cathode cleaning device
settler
filter
Zinc electrolysis tanks
storage
Optional transportation to DU-site
Lead plant
Pb and Pb compounds production