

SAFETY DATA SHEET
Zinc Oxide

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Issued: 09/05/2012
Revision No: 1

1. IDENTIFICATION OF THE SUBSTANCE / PREPARATION AND OF THE COMPANY / UNDERTAKING

Product name: ZINC OXIDE
REACH Registration number: 01-2119463881-32-XXXX
CAS-No.: 1314-13-2
EU Index No.: 030-013-00-7
EC No.: 215-222-5

Identified uses: Colouring agents, pigments. Food/feed stuff additives. Fuels and fuel additives. Intermediates. Laboratory chemicals. Lubricants and lubricant additives. Plating agents and metal surface treating agents. Process regulators, other than polymerisation or vulcanisation processes. Component in batteries. Corrosion inhibitors and anti-scaling agents. Fertilisers Photosensitive agents and other photo-chemicals. Process regulators, used in vulcanisation or polymerisation processes. Chemical Processing Aids. Pharmaceutical substance. Semiconductors. A complete list of uses are provided in the annex to this SDS.

Uses advised against: None.

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2. HAZARDS IDENTIFICATION

| | | |
|--------------------------------------|------------------------------|--|
| Classification (EC 1272/2008) | Physical and Chemical Hazard | Not classified. |
| | Human health | Not classified. |
| | Environment | Aquatic Acute 1 - H400; Aquatic Chronic 1 - H410 |

Classification (67/548/EEC) N; R50/53

The Full Text for all R-Phrases and Hazard Statements are Displayed in Section 16.

EC No.: 215-222-5

Label In Accordance With (EC) No. 1272/2008



Signal Word: Warning

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Hazard Statements:

H410 Very toxic to aquatic life with long lasting effects.

Precautionary Statements:

P273 Avoid release to the environment.

P391 Collect spillage.

P501 Dispose of contents/container in accordance with regional regulations.

Not Classified as PBT/vPvB by current EU criteria.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Substances:

| | |
|-----------------------------------|-----------------------|
| Product name: | ZINC OXIDE |
| REACH Registration number: | 01-2119463881-32 |
| CAS-No.: | 1314-13-2 |
| EU Index No.: | 030-013-00-7 |
| EC No.: | 215-222-5 |
| Gross Formula: | ZnO |
| Composition Comments: | 80 < Purity <100% w/w |

4. FIRST AID MEASURES (SYMPTOMS)

Description of first aid measures

| | |
|----------------------|--|
| Inhalation: | Move the exposed person to fresh air at once. Rinse nose and mouth with water. If respiratory problems, artificial respiration/oxygen. Get medical attention if any discomfort continues. |
| Ingestion: | Immediately rinse mouth and provide fresh air. Get medical attention if any discomfort continues. DO NOT INDUCE VOMITING! |
| Skin contact: | Remove affected person from source of contamination. Remove contaminated clothes and rinse skin thoroughly with water. Get medical attention if any discomfort continues. |
| Eye contact: | Make sure to remove any contact lenses from the eyes before rinsing. Promptly wash eyes with plenty of water while lifting the eye lids. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues. Most important symptoms and effects, both acute and delayed |
| Inhalation: | May cause an asthma-like shortness of breath. Coughing. Upper respiratory irritation. |
| Ingestion: | Gastrointestinal symptoms, including upset stomach. |
| Skin contact: | Skin irritation. Get medical attention. |
| Eye contact: | No specific symptoms noted. |

Indication of any immediate medical attention and special treatment needed:

Inhalation can cause a flu-like illness (metal fume fever). Consult a physician for specific advice.

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5. FIRE-FIGHTING MEASURES

Extinguishing media: This product is not flammable. Use fire-extinguishing media appropriate for surrounding materials.

Unsuitable extinguishing media: None.

Special hazards arising from the substance or mixture: Hazardous combustion products

When heated, vapours/gases hazardous to health may be formed.

Special Fire Fighting Procedures: Keep run-off water out of sewers and water sources. Dike for water control.

Protective equipment for fire-fighters: Use protective equipment appropriate for surrounding materials.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures: Avoid inhalation of dust. Provide adequate ventilation. For personal protection, see section 8.

Environmental precautions: Avoid release to the environment. Do not allow to enter drains, sewers or watercourses.

Methods and material for containment and cleaning up: Avoid generation and spreading of dust. Shovel into dry containers. Cover and move the containers. Flush the area with water.

Reference to other sections: For waste disposal, see section 13.

7. HANDLING AND STORAGE

Precautions for safe handling: Avoid spilling, skin and eye contact. Avoid handling which leads to dust formation. Provide good ventilation.

Conditions for safe storage, including any incompatibilities: Store in a cool and well-ventilated place. Keep containers tightly closed.

Specific end use(s): The identified uses for this product are detailed in Section 1.2. For further information see attached Exposure Scenario.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION**Control parameters**

| Name | STD | TWA - 8 Hrs | STEL - 15 Min | Notes |
|------------|-----|---------------------|----------------------|-------|
| ZINC OXIDE | WEL | 5 mg/m ³ | 10 mg/m ³ | |

WEL = Workplace Exposure Limit.

DNEL

| | | | | |
|----------|-------------|-----------|------------------|-----------------------|
| Industry | Dermal | Long Term | Systemic Effects | 83 mg/kg/day |
| Industry | Inhalation. | Long Term | Systemic Effects | 5 mg/m ³ |
| Consumer | Dermal | Long Term | Systemic Effects | 83 mg/kg/day |
| Consumer | Inhalation. | Long Term | Systemic Effects | 2.5 mg/m ³ |
| Consumer | Oral | Long Term | Systemic Effects | 0.83 mg/kg/day |

The units are expressed in 'mg/μg' of: Zinc.

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PNEC

| | | |
|-------------------------|----------|-------|
| Freshwater | 0.0206 | mg/l |
| Marine water | 0.0061 | mg/l |
| Sediment (Freshwater) | 235.6* | mg/kg |
| Sediment (Marine water) | 113* | mg/kg |
| Soil | 106.8** | mg/kg |
| STP | 0.052*** | mg/l |

The units are expressed in 'mg/μg' of: Zinc. These PNECs are added value PNECs- they are to be added to the natural background levels of: Zinc. - in the appropriate compartments (e.g. soils, sediments). (*) A generic bioavailability factor of 0.5 is applied by default, according to the EU risk assessment (ECB 2008). (**) by default this value was multiplied by '3' to take into account "lab-to-field" differences in toxicity. (***) The PNEC for STP was derived by applying an assessment factor to the lowest relevant toxicity value (5.2mg Zn/L). (Dutka et al., 1983)

Exposure controls:**Protective equipment:****Process conditions:**

Use engineering controls to reduce air contamination to permissible exposure level.

Engineering measures:

Provide adequate ventilation. Observe occupational exposure limits and minimize the risk of inhalation of dust.

Respiratory equipment:

In case of inadequate ventilation or risk of inhalation of dust, use suitable respiratory equipment with particle filter (type P2).

Hand protection:

Use suitable protective gloves if risk of skin contact. Wear suitable chemical resistance gloves approved to EN 374. Appropriate materials: rubber, leather, cotton.

Eye protection:

Wear approved safety goggles. Recommended: EN 166.

Hygiene measures:

DO NOT SMOKE IN WORK AREA! Wash hands at the end of each work shift and before eating, smoking and using the toilet. Wash promptly if skin becomes contaminated. Promptly remove any clothing that becomes contaminated. When using do not eat, drink or smoke.

Skin protection:

Wear apron or protective clothing in case of contact.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties:

| | |
|---|--------------------|
| Appearance: | Powder, dust |
| Colour: | White. |
| Odour: | Odourless. |
| Solubility: | Insoluble in water |
| Initial boiling point and boiling range: | Not relevant |

The sample decomposes before boiling.

Melting point (°C):

ZnO is very stable. No melting occurs. No exothermic or endothermic peaks are observed. No oxidation or decomposition was observed.

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| | |
|---|--|
| Relative density: | 5.68 g/cm ³ 20°C |
| Bulk Density: | 300-2000 kg/m ³ |
| Vapour density (air=1): | Not relevant |
| Vapour pressure: | Endpoint waived according to REACH Annex VII, IX or XI. |
| Evaporation rate: | Not applicable. |
| pH-Value, Conc. Solution: | 7 - 8 @ 20°C/100 g/l H ₂ O |
| Viscosity: | Not applicable. |
| Solubility Value (G/100G H₂O@20°C): | The water solubility of Zn in ZnO is 2.9 mg/l. |
| Decomposition temperature (°C): | Not applicable. |
| Flash point: | Endpoint waived according to REACH Annex VII, IX or XI: Not Applicable - Inorganic chemical. |
| Auto Ignition Temperature (°C): | Scientifically unjustified. |
| Flammability Limit - Lower (%): | Not applicable. This product is not flammable. |
| Flammability Limit - Upper (%): | Not applicable. |
| Partition Coefficient (N-Octanol/Water): | Not Applicable - Inorganic chemical. |
| Explosive properties: | The product has no flammability, explosive or self-in flammability properties. |
| Oxidising properties: | Does not meet the criteria for oxidising. |
| Mol. Weight: | 81.41 |

10. STABILITY AND REACTIVITY

| | |
|--|---|
| Reactivity: | Stable under normal temperature conditions and recommended use. |
| Chemical stability: | Stable under normal temperature conditions. |
| Possibility of hazardous reactions: | Zinc oxide and magnesium metal fillings or powder can react violently when heated. Chlorinated rubber and zinc oxide react violently or explosively at about 216 °C (in the presence or absence of hydrocarbon or halocarbon solvents). Violent reactions possible with hydrogen peroxide. |
| Conditions to avoid: | Avoid excessive heat for prolonged periods of time. |
| Incompatible materials: | |
| Materials To Avoid: | Acids, oxidising. Bases, alkalis (inorganic). Bases, alkalis (organic). |
| Hazardous decomposition products: | When heated, vapours/gases hazardous to health may be formed. |

11. TOXICOLOGICAL INFORMATION

Information on toxicological effects

Acute toxicity:

Acute Toxicity (Oral LD₅₀)

> 5000 mg/kg Rat

Not classified. Test method: equivalent or similar to OECD 401.

Acute Toxicity (Dermal LD₅₀)

Scientifically unjustified.

Acute Toxicity (Inhalation LC₅₀)

> 5.7 mg/l (vapours) Rat 4 hours

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Skin Corrosion/Irritation:

Dose

500 mg 25 hr Rabbit

(Löser, 1977; Lansdown, 1991)

Not irritating.

Serious eye damage/irritation:

Not Irritating. Test method: OECD 405.

Respiratory or skin sensitisation:

Respiratory sensitisation

Rat

There is no evidence that the material can lead to respiratory hypersensitivity. (Van Huygevoort 1999)

Skin sensitisation

Guinea pig maximization test (GPMT): Guinea Pig

Test method: OECD 406. (Van Huygevoort 1999)

Not Sensitising.

Germ cell mutagenicity:

Genotoxicity - In Vitro

Gene Mutation:

In vitro genotoxicity studies indicate that zinc compounds do not have genotoxic activity [Zinc CSR(s), 2010]. This conclusion is in line with those achieved by other regulatory reviews of the genotoxicity of zinc compounds (WHO, 2001; EU RAR, 2004, MAK, 2009). Negative.

Genotoxicity - In Vivo

Chromosome aberration:

In vivo genotoxicity studies indicate that zinc compounds do not have genotoxic activity [Zinc CSR(s), 2010]. This conclusion is in line with those achieved by other regulatory reviews of the genotoxicity of zinc compounds (WHO, 2001; EU RAR, 2004, MAK, 2009). Negative.

Carcinogenicity:

Carcinogenicity:

No experimental or epidemiological evidence exists to justify classification of zinc compounds for carcinogenic activity (based on cross-reading between Zn compounds; no classification for carcinogenicity required) (Chemical Safety report (CSR) zinc oxide. 2010).

Reproductive Toxicity:

Reproductive Toxicity:

Fertility

Fertility: Rat

No experimental or epidemiological evidence exists to justify classification of zinc compounds for reproductive or developmental toxicity (based on cross-reading between Zn compounds; no classification for reproductive toxicity required) (Chemical Safety report (CSR) for zinc compounds. 2010)

Reproductive Toxicity: Development

Developmental toxicity: Rat

Not classified based on read across data from other zinc compounds.

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Specific target organ toxicity - single exposure:**STOT - Single exposure**

No experimental or epidemiological sufficient evidence for specific target organ toxicity (single exposure) (no classification for target organ toxicity (single exposure: STOT-SE) required) (Heydon and Kagan, 1990; Gordon et al., 1992; Mueller and Seger, 1985 [Cited in Chemical Safety report (CSR) zinc oxide. 2010])).

Specific target organ toxicity - repeated exposure:**STOT - Repeated exposure**

No experimental or epidemiological sufficient evidence for specific target organ toxicity (repeated exposure) (no classification for specific target organ toxicity (repeated exposure: STOT-RE) required) (Lam et al, 1985, 1988; Conner et al. , 1988 [Cited in Chemical Safety report (CSR) for zinc(s). 2010])).

Aspiration hazard:

| | |
|--------------------------------|---|
| Viscosity: | Not classified. |
| Skin contact: | Powder may irritate skin. Mild dermatitis, allergic skin rash. |
| Medical Considerations: | Inhalation of dusts may irritate the respiratory tract. Zinc is present in drugs (medication) in small amounts up to 25 mg. |

12. ECOLOGICAL INFORMATION

| | |
|--------------------------------|--|
| Ecotoxicity: | Do not discharge into drains, water courses or onto the ground. |
| Toxicity: | The M-Factor for zinc oxide is 1, referring to a) the acute aquatic ecotoxicity values of 136 µg Zn/l and 413 µg Zn/l for the zinc ion at pH 8 and 6 respectively, b) the molecular weight ratio of ZnO versus Zn ⁺⁺ , and c) the results of the T/D testing, showing that ZnO has lower solubility than the soluble zinc compounds. |
| ACUTE AQUATIC TOXICITY: | The Acute aquatic toxicity database on zinc contains data on 11 standard species obtained under standard testing conditions at different pH and hardness. Since the transformation/dissolution of zinc metal is dependent on pH, the available acute aquatic toxicity dataset has also been considered for 2 different pH ranges separately. The full analysis of these data is given in the CSR. The reference values for acute aquatic toxicity, based on the lowest observed EC50 values of the corresponding databases at different pH and expressed as Zn ⁺² ion concentration are: <ul style="list-style-type: none"> • for pH <7: 0.413 mg Zn⁺²/L (48 hr - Ceriodaphnia dubia test according to US EPA 821-R-02-012 standard test protocol) • for pH >7-8.5: 0.136 mg Zn⁺²/L (72 hr - Selenastrum capricornutum (=Pseudokirchneriella subcapitata) test according to OECD 201 standard protocol) |

As demonstrated by transformation/dissolution (T/D) testing according to OECD guidelines, zinc oxide is less soluble, as compared to soluble zinc compounds. Applying the molecular weight correction and the results of the T/D testing (CSR), the specific reference values for acute aquatic toxicity of zinc oxide are:

For zinc oxide (based on 62% solubilisation capacity on finest powders at most conservative loading of 1 mg/L at pH 8 (RA zinc oxide, ECB 2008), and a ZnO/Zn molecular weight ratio of 1.24):

- for pH <7: 0.83 mg Zn/L (based on 48 hr Ceriodaphnia dubia test cfr above)

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CHRONIC AQUATIC TOXICITY: The chronic freshwater aquatic toxicity database on zinc contains high quality chronic NOEC/EC10 values on 23 species (8 taxonomic groups) obtained under a variety of conditions. The chronic marine-water aquatic toxicity database on zinc contains high quality chronic NOEC/EC10 values on 39 species (9 taxonomic groups) obtained under a variety of conditions. These data, outlined in the CSR, were compiled in a species sensitivity distribution, from which the PNECs for freshwater and marine-water were derived (expressed as Zn⁺²ion concentration).

SEDIMENT TOXICITY: The chronic toxicity of zinc to sediment organisms in the freshwater was assessed based on a database containing high quality chronic NOEC/EC10 values on 7 benthic species obtained under a variety of conditions. These data, outlined in the CSR, were compiled in a species sensitivity distribution, from which the PNEC was derived (expressed as total Zn contained in the sediment).

For marine sediments, a PNEC was derived using the equilibrium partitioning approach.

SOIL TOXICITY: The chronic toxicity of zinc to soil organisms was assessed based on a database containing high quality chronic NOEC/EC10 values on 18 plant species, 8 invertebrate species and 17 microbial processes, obtained under a variety of conditions. These data, outlined in the CSR, were compiled in a species sensitivity distribution, from which the PNEC was derived (expressed as total Zn contained in the soil).

Degradability: The product solely consists of inorganic compounds which are not biodegradable. Zinc is an element, and as such the criterion "persistence" is not relevant for the metal and its inorganic compounds in a way as it is applied to organic substances. An analysis on the removal of zinc from the water column has been presented as a surrogate for persistence. The rapid removal of zinc from the water column is documented in the CSR. So, zinc and zinc compounds do not meet this criterion, neither.

Phototransformation: Not applicable.

Stability (Hydrolysis): Not applicable.

Biodegradation: Not Applicable - Inorganic chemical.

Bioaccumulative potential: The product is not bioaccumulating. Zinc is a natural, essential element, which is needed for the optimal growth and development of all living organisms, including man. All living organisms have homeostasis mechanisms that actively regulate zinc uptake and absorption/excretion from the body; due to this regulation, zinc and zinc compounds do not bio-accumulate or bio-magnify.

Partition coefficient: Not Applicable - Inorganic chemical.

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Mobility in soil**Mobility:**

For zinc (like for other metals) the transport and distribution over the different environmental compartments e.g. the water (dissolved fraction, fraction bound to suspended matter), soil (fraction bound or complexed to the soil particles, fraction in the soil pore water, ...) is described and quantified by the metal partition coefficients between these different fractions. In the CSR, a solids-water partitioning coefficient of 158.5 l/kg (log value 2.2) was applied for zinc in soils (CSR zinc 2010).

Surface tension:

Not Applicable - Inorganic chemical.

Results of PBT and vPvB assessment: This product does not contain any PBT or vPvB substances.

Other adverse effects: None known.

13. DISPOSAL CONSIDERATIONS**Waste treatment methods:**

Dispose of waste and residues in accordance with local authority requirements. Residues and empty containers should be taken care of as hazardous waste according to local and national provisions. Waste catalogue number and code must be decided by the end user based on the actual use of the product.

14. TRANSPORT INFORMATION**UN number:**

UN No. (ADR/RID/ADN) 3077

UN No. (IMDG) 3077

UN No. (ICAO) 3077

UN proper shipping name:

Proper Shipping Name: UN 3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Zinc Oxide) 9, III, (E)

Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.

Transport hazard class(es):

ADR/RID/ADN Class 9

ADR/RID/ADN Class Class 9: Other dangerous substances.

ADR Label No. 9

IMDG Class 9

ICAO Class/Division 9

Transport Labels:

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Packing group

| | |
|----------------------------------|-----|
| ADR/RID/ADN Packing group | III |
| IMDG Packing group | III |
| ICAO Packing group | III |

Environmental hazards

Environmentally Hazardous Substance/Marine Pollutant

**Special precautions for user**

| | |
|--------------------------------|----------|
| EMS | F-A, S-F |
| Emergency Action Code | 2Z |
| Tunnel Restriction Code | (E) |

Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code: Not applicable

| |
|-----------------------------------|
| 15. REGULATORY INFORMATION |
|-----------------------------------|

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

Guidance Notes: Workplace Exposure Limits EH40.

EU Legislation: Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC, including amendments. Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006 with amendments.

Chemical Safety Assessment: A chemical safety assessment has been carried out.

Note: The regulatory information given above only indicates the principal regulations specifically applicable to the product described in the safety data sheet. The user's attention is drawn to the possible existence of additional provisions which complete these regulations. Refer to all applicable national, international and local regulations or provisions.

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16. OTHER INFORMATION**General information**

Only trained personnel should use this material.

The following information is provided to conform with article 13 of the EC Directive on Packaging and Packaging Waste 94/62/EC:

- Wherever possible we use returnable packaging and pallets. Details of these are on our Sales Contracts
- For any non-returnable packaging the cost of disposal is at your expense, but we do have a list of reprocessors available
- In most cases, but not all, we are able to supply products in returnable packaging but the additional cost of this will be for the customer's expense. Please ask for details with your specific requirements
- Any products supplied in returnable packaging is clearly marked to this effect.

Risk Phrases In Full: R50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Hazard Statements In Full: H400 Very toxic to aquatic life.
H410 Very toxic to aquatic life with long lasting effects.

Legal disclaimer: The information contained in this SDS does not constitute a risk assessment, and should not replace the user's own assessment of risks as required by other health and safety legislation. This advice is given by Nexchem Ltd who accept no legal liability for it except otherwise provided by law. The information contained herein is based on the present state of our knowledge and is intended to describe our products from the point of view of safety requirements. It should not therefore be construed as guaranteeing specific properties.

