Material Safety Data Sheet
Zinc Oxide

Edition: 05/07/2017

In compliance with Regulation (EC) No 1907/2006 (REACH) Annex II

1) Identification of substance/preparation and of the company undertaking

Material	Zinc Oxide
Synonyms:	Zinc white, Chinese white, Zinc Monoxide
Chemical Formula:	ZnO
EC No	2015-222-5
CAS No	1314-13-2
REACH Registration No	01-2119463881-32-XXXX
Company	Inoxia Ltd 45.7 Dunsfold Park Stovolds Hill Cranleigh Surrey GU6 8TB Tel: 02032 909990 safety@inoxia.co.uk www.inoxia.co.uk

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

1.2.1. Relevant identified uses

Paint, rubber, ink, plastics, enamel, glass, astringent topical protectant, antiseptics, electronics, adhesives, chemical products, cosmetics, pharmaceutical.

Uses advised against

No information available

2) Hazards identification.

Product definition: Substance

Classification according to Regulation (EC) No. 1272/2008 [CLP/GHS]

Aquatic Acute Hazard: Category 1, M-factor 1 H400. Very toxic to aquatic life.

Aquatic Chronic Hazard: Category 1, M-Factor 1 H410. Very toxix to aquatic life, with long lasting effects.

Full text of H-phrases: see section 16

See Section 11 for more detailed information on health effects and symptoms.

2.2. Label elements

Labelling according to Regulation (EC) No. 1272/2008 (CLP)

Hazard pictograms (CLP):

GHS-09

Signal word (CLP): Warning

Hazard statements (CLP) :

H400: Very toxic to aquatic life.

H410: Very toxic to aquatic life, with long lasting effects.

Precautionary statements (CLP):

P273: Avoid release to the environment.

P391: Collect spillage.

P501: Dispose of contents/container in accordance with applicable waste regulations.

2.3. Other hazards

This substance/mixture does not meet the PBT criteria of REACH, annex XIII.

This substance/mixture does not meet the vPvB criteria of REACH, annex XIII.

3) Composition/information on ingredient

3.1. Substances

Chemical Name	EC-No	CAS-No.	Weight %	Index No. of Annex Vi	Classification (1272/2008/EC)	Reach Registration Number
Zinc Oxide	215-222-5	1314-13-2	≥95% - ≥99.9%	030-013-00-7	Aquatic Acute 1 H400 Aquatic Chronic 1 H410	01-2119463881-32- XXX

There are no additional ingredients present which, within the current knowledge of the supplier, are classified and contribute to the classification of the substance and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

For the full text of the H-Statements mentioned in this Section, see Section 16.

4) First Aid Measures

4.1. Description of first aid measures

Inhalation: Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact: Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Eye contact: Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 20 minutes. Get medical attention if irritation occurs.

Ingestion: Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention if adverse health effects persist or are severe. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Protection of first-aiders: No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

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

Eye contact: Exposure to airborne concentrations above statutory or recommended exposure limits may cause irritation of the eyes.

Inhalation: Exposure to airborne concentrations above statutory or recommended exposure limits may cause irritation of the nose, throat and lungs.

Skin contact: No known significant effects or critical hazards.

Ingestion: No known significant effects or critical hazards.

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

Notes to physician: Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

5) Fire Fighting

5.1. Extinguishing media

Suitable extinguishing media: Use extinguishing media suitable for surrounding fire.
Unsuitable extinguishing media: High volume water jet

5.2. Special hazards arising from the substance or mixture

Fire hazard: Not flammable.
Explosion hazard: No data available.
Reactivity: Stable under normal conditions of handling and storage.
Special hazard: Hazardous decomposition products formed under fire conditions: Carbon oxides, Lithium oxide. Do not allow run-off from fore fighting to enter drains or water courses.

5.3. Advice for firefighters

6) Accidental Release

6.1. Personal precautions, protective equipment and emergency procedures

General measures: Keep public away from danger area. See section 8.2. Keep away from heat source.

6.1.1. For non-emergency personnel

No additional information available

6.1.2. For emergency responders

No additional information available

6.2. Environmental precautions

Prevent entry to sewers and soil. Notify authorities if product enters sewers or public waters.

6.3. Methods and material for containment and cleaning up

Methods for cleaning up: Sweep or shovel spills into appropriate container for disposal. Avoid dust production.

6.4. Reference to other sections

See section 8 and 13 for more information.

7) Handling/Storage

7.1. Precautions for safe handling

Precautions for safe handling: Do not breathe dust. Wash hands plentifully and other exposed areas with water after handling. Remove contaminated clothing and shoes. Wash clothing before re-using.
Packaging: Even those that have been emptied, will retain product residue. Always obey safety warnings and handle empty packaging as if they were full. Avoid all contact with this substance.

Hygiene measures: When using do not eat, drink or smoke. Wash hands and other exposed areas with mild soap and water before eat, drink or smoke and when leaving work. Remove contaminated clothing and shoes.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions: Store in dry, cool, well-ventilated area. Keep away from food, drink and animal feeding stuffs.

7.3. Specific end use(s)

No further information available

8) Exposure Controls/Personal Protection

The information in this section contains generic advice and guidance. The list of Identified Uses in Section 1 should be consulted for any available use-specific information provided in the Exposure Scenario(s).

8.1. Control parameters

Occupational exposure limits:

Chemical Name	Exposure limit values (EH40-OES)
Zinc Oxide	STEL: 10mg/m³ 15 minute(s).Form: Dust TWA: 5mg/m³ 8 hour(s). Form : Fume

8.1.1.DNEL/DMEL and PNEC values:

DNEL Values

End Use	Route/Exposure	Value
DNEL oral Zn soluble	Oral	50 mg Zn/day (0.83 mg Zn/kg bw/day)
DNEL oral Zn insoluble	Oral	50 mg Zn/day (0.83 mg Zn/kg bw/day)
DNEL dermal Zn soluble	Dermal	500 mg Zn/day (8.3 mg Zn/kg bw/day)
DNEL dermal Zn insoluble	Dermal	5000 mg Zn/day (83 mg Zn/kg bw/day)
DNEL inhalation Zn soluble (worker)	Inhalation (Worker)	1 mg Zn/m³
DNEL inhalation Zn insoluble (worker)	Inhalation (Worker)	5 mg Zn/m³
DNEL inhalation Zn soluble (consumer)	Inhalation (Consumer)	1.3 mg Zn/m³
DNEL inhalation Zn insoluble (consumer)	Inhalation (Consumer)	2.5 mg Zn/m³

PNEC Values (Derived for the Zinc Ion)

Compartment (Environment)	PNEC value for Zn Ion
Freshwater	20.6* µg/L
Saltwater	6.1* µg/L
STP	100 µg/L
Freshwater sediment	117.8 *mg/kg sediment d.w. A generic bioavailability factor of 0.5 is applied by default PNECbioav: 235.6 mg/kg sediment d.w.
Saltwater sediment	56.5 *mg/kg sediment d.w. A generic bioavailability factor of 0.5 is applied by default PNECbioav: 113 mg/kg sediment d.w.
Soil	35.6 *mg/kg soil d.w. A generic bioavailability/ageing factor of 3 is applied by default PNECbioav: 106.8 mg/kg soil d.w.
Oral	No potential for bioaccumulation

* Added value

Calculation of local exposure- Bioavailability correction

The local exposure at a given site can be calculated specifically using the excel sheet prepared by Arche (see "DU scaling tool" on the "tools" page on http://www.reach-zinc.eu/) In addition, bioavailability corrections can be integrated in the exposure assessment, if the environmental parameters that are needed for the calculations, are documented.

- For water assessment, bioavailability model correction can be applied when the following water parameters are documented for the receiving water: Dissolved organic carbon (DOC), pH, hardness or Ca-concentration. For the calculations, the "zinc BLMcalculator" excel tool is used to this end (see "tools" on http://www.reachzinc.eu/). When the local values of these parameters are unknown, regional data can be used as an alternative. Use of regional instead of local values should always be handled with caution.
- For sediment, a generic bioavailability factor of 2 is already integrated in the PNEC, based on AVS/SEM levels and according to the risk assessment (ECB 2008). A further refinement of local bioavailability can be made when local AVS/SEM concentrations are documented. The bioavailable fraction of zinc is given by subtracting local AVS from local SEM-Zn (SEM-Zn - AVS).
- For soil, a worst case bioavailability correction (corresponding to sandy soils) is already integrated. Further refinement for zinc bioavailability in other soil types is possible, when the local soil type is documented, together with pH, CEC (see "tools" on http://www.reach-zinc.eu/)

8.2. Exposure controls

Appropriate engineering controls: If handling conditions produce dust, it should be necessary to use personal protective equipments. Do not eat, drink or smoke while handling the product. At the end of work, wash or shower. Before breaks, wash hands. After work shower or wash. Change work clothes after handling the product. Remove soiled or splashed clothing and wash it before re-using it. Shower and washroom facilities should be separate from changing rooms. The substance must be kept away from food, drink and condiment.

Individual protection measures, such as personal protective equipment:

Eye/face protection: Well-fitted chemical protective goggles with plastic lenses (e.g. Clear PVC). Or facial safety screen. It is generally known that contact lenses must not be worn when working with chemicals because they may contribute to the severity of possible damage to the eyes.

Hand protection: Protective gloves: Nitrile rubber (EN374). Glove thickness: 0.11 mm. Break through time:

Skin and body protection: Long sleeved clothing.

Respiratory protection: In the case of dust or aerosol formation use respirator with an approved filter (EN143).

Recommended filter type: P2

Hygiene measures: Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes and clothing. When using, do not eat, drink or smoke. Wash hands before breaks and immediately after handling the product. Provide regular cleaning of equipment, work area and clothing.

Environmental Exposure Controls: Do not allow material to contaminate ground water system

9) Physical/Chemical Properties

9.1. Information on basic physical and chemical properties

Appearance at 20 ºC and 1013 hPa:	Physical state: Solid (powder or granules) Colour: Yellowish white
Odour:	Odourless
pH:	Not applicable
Melting/freezing point:	ZnO is very stable. No melting occurs. No exothermic or endothermic peaks are observed. No oxidation or decomposition was observed.
Boiling point/boiling range:	Not relevant; the sample decomposes before boiling.
Flash point:	Not applicable to inorganic substance (column 2 of annex VII of REACH Regulation).
Evaporation rate:	Not applicable to solids
Flamability:	All grades of zinc powder were not to be considered as flammable.
Upper/lower flammability or explosive limits:	Not applicable
Vapour pressure:	Not applicable if the melting point is above 300ºC (column 2 of Annex VII of the REACH Regulation).
Vapour density:	Not applicable
Relative density:	5,68 g/cm3
Water solubility:	2,9 mg/l
Partition coefficient n-octanol/water:	Not applicable if the substance is inorganic column 2 of Annex VII of the REACH Regulation).
Auto-ignition temperature:	The substance is not auto-flammable

Decomposition temperature:	Not applicable
Viscosity:	Not applicable (solid)
Explosive properties:	Zinc oxide has no flammability, explosive or self-flammability properties.

9.2. Other information
No additional information

10) Stability/Reactivity

10.1. Reactivity
There are no specific data related to this product or its ingredients.

10.2. Chemical stability
Stable under the recommended use and storage conditions.

10.3. Possibility of hazardous reactions
No dangerous reactions are expected in regular conditions of use and storage

10.4. Conditions to avoid
Heating, dust production, ignition sources and incompatibilities.

10.5. Incompatible materials
Acids, alkalis, aluminium, magnesium and strong oxidising agents

10.6. Hazardous decomposition products
None known

11) Toxicological Info

Acute Toxicity:

Type	Specie	Result	Reference
Oral	Rat Rat	DL50 = 15000mg/kg DL50 > 5000mg/kg	Löser (1972) Löser (1977)
Inhalation	Rat	CL50 (4h) > 5.7mg/l	Klimisch et al.

With LD50 values consistently exceeding 2000 mg/kg bw, slightly soluble compounds such as zinc oxide (LD50 ranges between 5000 and 15000 mg/kg bw) show low level of acute oral toxicity, not leading to classification for acute oral toxicity. Zinc oxide is shown to be of low acute inhalation toxicity (LC50 4h >5,7 mg/l), not leading to classification for acute inhalation toxicity.

Irritation/corrosion:
Skin: not irritant (Löser, 1977; Lansdown, 1991)
Eye: not irritant (Van Huygevoort, 1999e; Thijssen, 1978; Löser, 1977)
Respiratory tract: not irritant (Klimish et al., 1982)

Sensitisation: No sensitizing effects know (Van Huygevoort de 1999 g.h.)

Germ Cell Mutagenicity: No biologically relevant genotoxic activity (based on cross-reading between Zn compounds; no classification for mutagenicity required) (Chemical Safety Report (CSR), zinc oxide 2010).
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) (CSR, zinc oxide 2010).
Reproductive toxicity: 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) (CSR, zinc oxide 2010).
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 y Kagan, 1990; Gordon et al., 1992; Mueller y Seger, 1985 [Cited in CSR, zinc oxide 2010]).
STOT-repeated exposure: No experimental or epidemiological sufficient evidence for specific target organ toxicity (single exposure). No classification for target organ toxicity (single exposure STOT-RE) required (Lam et al., 1985, 1988; Conner et al., 1988 [Cited in CSR, zinc oxide 2010]).
Aspiration hazard: There is no data available.

12) Ecological Information

12.1. Toxicity

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 two 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++ ion concentration are:

- For pH < 7: 0,413 mg Zn++/l (48hr - Ceriodaphnia dubia test according to US EPA 821-R-02-012 standard test protocol; reference: Hyne et al. 2005)
- For pH > 7-8,5: 0,136 mg de Zn++/l (72hr - Selenastrum capricornutum (= Pseudokircherniella subcapitata) test according to OCDE 201 standard protocol; reference: Van Ginneken, 1994)

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):

- For pH < 7: 0,67 mg Zn/l (48h - Ceriodaphnia dubia test; see above).
- For pH > 7-8,5: 0,21 mg Zn/l (72h - Selenastrum capricornutum test; see above).

M-factor: 1

Chronic aquatic toxicity: freshwater

The chronic aquatic toxicity database on zinc contains high quality chronic NOEC/EC10 values on 23 species (8 taxonomic groups) 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 Zn++ ion concentration). This PNEC is an added value, i.e., it is to be added to the zinc background in water (see section 8.1.2).

The general reference value for chronic aquatic toxicity due to the Zn++ ion (relevant for pH > 7 – 8.5) is based on the lowest species NOEC/EC10 value of the chronic aquatic effects database. The value is a species geomean of 34 NOEC/EC10 values obtained on the standard species Pseudokircherniella subcapitata (unicellular algae) and is expressed as Zn++ ion concentration: 19 µg Zn/l (Chemical safety report zinc oxide), 2010).

The reference value for chronic aquatic toxicity at pH 6 was calculated from the same chronic ecotoxicity database for the standard species at each taxonomic level (algae, invertebrates, and fish) for which bioavailability models are available, and by selecting the lowest value of the 3 taxonomic groups as follows:

- For algae, the NOEC of the BLM-species Pseudokircherniella subcapitata is the lowest of the SSD at pH 8 (19 µg/l – see above). This value corresponds to a water of pH 8.0, hardness 24 mg CaCO3 and DOC 2.0 mg/l. With the BLM, a corresponding species NOEC of 142 µg/l was calculated for this species at pH 6 (other water conditions kept the same).
- For invertebrates, the BLM-species Daphnia magna gives a species mean at pH 8 of 98 µg/l, corresponding to a water of pH 8, hardness 24 mg CaCO3/l and DOC 1.2 mg/l. The Daphnia magna-BLM predicts at pH 6 (other water conditions same) a species NOEC of 82 µg/l.
- For Oncorrhynchus Mykiss, the species mean at pH 8 is 146 µg/l (hardness 45 mg/l, DOC 2 mg/l). Using the corresponding fish BLM gives a species NOEC of 146 µg/l at pH 6 (other conditions same).

From this analysis, the reference value for chronic aquatic effect for zinc at pH 6.0 was set at 82 µg Zn/l (Daphnia magna) (Chemical safety report zinc oxide), 2010).

The specific reference values for chronic aquatic toxicity of zinc oxide are calculated by applying the correction for the ZnO/Zn molecular weight ratio (81.4/65.4 = 1.25). Only this molecular weight correction is applied, since no transformation/dissolution data over 28days testing are available on ZnO (also considering the solubility of Zn in ZnO after 8d, see 12.1.1.):

- • For pH 6 - <7: 0.082 mg Zn/l x 1.25 = 102.1 µg/l (Pseudokircherniella subcapitata)
- For pH 6 - 7 - 8.5: 0.019 mg Zn/l x 1.25 = 23.8 µg/l (Daphnia magna)

In addition, for determination of the chronic aquatic effects classification according to the 2nd ATP CLP criteria, it has to be considered further if the substance is rapidly degradable or not.

The concept of “Degradability” was developed for organic substances and is not applicable as such to inorganic substances like zinc. As a surrogate approach for assessing “degradability”, the concept of “removal from the water column” was developed to assess whether or not a given metal ion would remain present in the water column upon addition (and thus be able to exert a chronic effect) or would be rapidly removed from the water column. In this concept, “rapid removal from the water column” (defined as >70% removal within 28 days) is considered as equivalent to “rapidly degradable”. The rapid removal of zinc from the water column is documented (Chemical safety report ZnO 2012). Consequently, zinc and zinc compounds are considered as equivalent to being ‘rapidly degradable” in the context of classification for chronic aquatic effects.

M-factor: 1

Chronic aquatic toxicity: marine waters
The chronic 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 PNEC was derived (expressed as Zn ++ ion concentration). This PNEC is an added value, i.e., it is to be added to the zinc background in water (see section 8.1.2).

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 sensitive distribution, from which the PNEC was derived (expressed as total Zn contained in the sediment). This PNEC is an added value, to be added on the zinc background in the sediment (see section 8.1.2).

For the marine sediments, a PNEC was derived using the equilibrium partitioning approach (see section 8.1.2).

Soil toxicity
The chronic toxicity of zinc to soil organisms in the freshwater 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 sensitive distribution, from which the PNEC was derived (expressed as total Zn contained in the soil). This PNEC is an added value, to be added on the zinc background in the soil (see section 8.1.2).

Toxicity to micro-organisms in STP
The PNEC for STP was derived by applying an assessment factor to the lowest relevant toxicity value: 5,2 mg Zn/l (Dutka et al., 1983).

12.2. Persistence and degradability
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 fro 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.

12.3. Bioaccumulative potential
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 bioaccumulate or biomagnify.

12.4. Mobility in soil
For zinc (like for the 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).

12.5. Results of PBT and vPvB assessment
This substance/mixture does not meet the PBT criteria of REACH, annex XIII.
This substance/mixture does not meet the vPvB criteria of REACH, annex XIII.

12.6. Other adverse effects
No known significant effects or critical hazards.

13) Disposal Considerations

13.1. Waste Treatment Methods

Substance
Examine possibilities for re-utilization. The chemical waste is special waste and is subject to the internal (local and national) regulations of each country. Duly contact the competent authority or legally authorised waste disposal handlers. European Regulations: Directive 98/2008/CE of the European Parliament and the Council of 19 November 2008 on waste and repealing certain Directives (DOUE L 312 de 22/11/2008).

Packaging
Contaminated containers can be reused if they are completely emptied and have been cleaned properly. Contaminated containers and packaging of dangerous mixtures or substances shall be disposed of in the same way as the products that they contain. European regulations: Directive 94/62/CE of the European Parliament and of the Council of 20 December 1994 on packaging and packaging waste (DOUE L 365 de 31/12/1994).

14) Transport Information

14.1. UN Number
3077 (ADR/RID, IMDG, ICAO/IATA)

14.2. UN Proper Shipping Name
Environmentally hazardous substance, solid, N.O.S. (ADR/RID, IMDG, ICAO/IATA)

14.3. Transport Hazard Class(es)
9 (ADR/RID, IMDG, ICAO/IATA)

14.4. Packing group
III (ADR/RID, IMDG, ICAO/IATA)

14.5. Environmental hazards
See section 12

14.6. Special precautions for user
See sections 6 and 7
Additional information: Tunnel Code (E)

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
No available information

15) Regulatory Information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture
Council Directive of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers (89/391/EEC)

15.2. Chemical safety assessment
A chemical safety assessment has been carried out for this substance in the context of the REACH registration.

16) Other Information

The information detailed in this safety data sheet is based on our knowledge at the date stated; it refers exclusively to the product indicated and does not constitute a guarantee of particular qualities. It is the user's responsibility to use the product in accordance with the recommendations in this safety data sheet.
Version 5.1
Changes with respect to the previous version:

- Adaptation to Regulation (UE) 2015/830.
- Update of sections 2 and 8.1

16.1. Chemical safety assessment
List of uses for which a Generic Exposure Scenario (GES) is provided as Annex
Numerous uses were identified for ZnO. These are listed in table in Annex, with the indication of the Generic Exposure Scenario (GES) that is relevant to these identified uses.

16.2. List of Abbreviations
AC: Article category
ADR: European agreement concerning the international carriage of dangerous goods by road
CAS: Chemical Abstracts Service
CLP: Clasification, Labeling & Packaging
DMEL: Derived minimal effect level
DNEL: Derived no effect level
EC50: Median effective concentration
ERC: Environmental release category
GES: Generic exposure scenario
IATA: International air transport association
ICAO: Technical instructions for the Safe Transport of Dangerous Goods by Air
IMDG: International Maritime Dangerous Goods
LC50: Median lethal concentration
LD50: Median lethal dose
NO(A)EC: No observed (adverse) effect concentration
NO(A)EL: No observed (adverse) effect level
OECD: Organisation for Economic Cooperation and Development
PBT: Persistent, bioaccumulative and toxic

PC: Product category
PNEC: Predicted no effect concentration
PROC: Process category
REACH: Registration, evaluation, authorization and restriction of chemicals
RID: International Rule for Transport of Dangerous Substances by Railway
STP: Sewage treatment plant
SU: Sector of use
vPvB: very persistent, very bioaccumulative

16.3. References

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