

SAFETY DATA SHEET ZINC OXIDE USP

1. PRODUCT INFORMATION AND COMPANY IDENTIFICATION

Product Name: Zinc Oxide USP

Company: YellowBee Packaging and Supplies Inc.
Unit 106, 2880 107 Ave SE
Calgary Alberta T2Z3R7
Phone: 587-352-3929

2. HAZARD IDENTIFICATION

Classification of the substance or mixture

In accordance with regulation (EC) No. 1272/2008 Regulation (CLP/GHS)

Aquatic Acute 1 H400: Very toxic to aquatic life, M factor 1. Aquatic Chronic 1 H410: Very toxic to aquatic life with long lasting effects, M factor 1.

Label elements:

According to regulation (EC) No. 1272/2008 (CLP/GHS)

GHS hazard pictogram 09: Environmental



Keyword

Attention

Hazard statements

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

Precautionary Statements

P273: Do not disperse in the environment.

P391: Collect spillage



P501: Dispose of contents/container in accordance with local/regional/international regulations

Other dangers

The product does not contain any PBT / vPvB substances. The mixture does not contain substances included in the list established according to article 59(1) for their endocrine disrupting properties, or substances that have been identified as endocrine disrupting according to the criteria established in the Delegated Regulation (EU) 2017/2100 of the Commission or in Regulation (EU) 2018/605 of the Commission.

3. COMPOSITION/INFORMATION ON INGREDIENTS

| INCI NAME | CAS NO. | CONCENTRATION (%) |
|------------------|----------------|--------------------------|
| Zinc oxide | 1314-13-2 | 97-100 |

4. FIRST AID MEASURES

First aid description

General information

No specific effects or symptoms have been reported or known. Remove the person from the exposure area.

Inhalation

Move to fresh air. If not breathing, apply artificial respiration. If breathing is difficult, give oxygen. See a doctor if symptoms persist.

Ingestion

Wash out mouth with water. Make the affected person drink plenty of water. Do not induce vomiting. See a doctor if symptoms persist

Skin

Remove contaminated clothing. Wash with plenty of soap and water. If necessary use a moisturizing lotion.

Eye

Wash with plenty of water. Remove contact lenses and continue rinsing for 15 minutes keeping eyelids open. See a doctor if symptoms persist

First aid protection

Avoid exposure, use additional protection as conditions warrant. (see section 8)

Most important symptoms and effects, acute and delayed: Most important symptoms and effects, acute and chronic



Acute: dry cough, throat irritation, flu-like condition. Delayed: Late symptoms are not expected.

Indication of any medical attention and special treatment that must be given immediately

Nausea, strong cough, migraine. Move person to fresh air.

5. FIRE FIGHTING MEASURES

**Extinguishing media
appropriate extinguishing measure**

The product itself is not combustible; Adapt firefighting measures to surrounding areas. Foam, water, dry chemical or carbon dioxide.

Unsuitable extinguishing media Not available

Flash point and method Does not apply

explosive limit Does not apply

Automatic ignition Does not apply

NFPA Ratings Health: 1, Fire: 0 and Reactivity: 0
Danger scale 0 = Minimal, 1 = Mild, 2 = Moderate, 3 = Serious, and 4 = Serious

Combustion decomposition products Not available

Special hazards arising from the substance or mixture

Zinc oxide fumes may be released in a fire involving zinc oxide. Water contaminated with this material must be prevented from being discharged into the environment.

Recommendations for fire fighting personnel

Firefighters must be fully trained and wear full protective clothing, including an approved self-contained breathing apparatus that supplies positive air pressure within a full facepiece.

Personal protection equipment

Appropriate breathing apparatus may be required.

Additional Information

Collect contaminated water for fire fighting separately, should not be discharged into drains.

6. ACCIDENTAL RELEASE MEASURES



Personal precautions, protective equipment and emergency procedures.

See protective measures listed in Sections 7 (Handling and Storage) and 8 (Exposure Controls/Personal Protection). Avoid dust formation.

Environmental precautions

Do not discharge into drains / surface water / groundwater.

Methods and material for containment and cleaning up

Pick up mechanically. Avoid raising dust. Ship in suitable containers for recovery or disposal.

Reference to other sections

See section 8 for personal protective equipment and section 13 for waste treatment methods.

7. HANDLING AND STORAGE

Precautions for safe handling

Provide good ventilation of the work area (local exhaust ventilation, if necessary. Keep away from sources of ignition; refrain from smoking. Dust may form an explosive mixture with air. Take precautionary measures against static charges. Employees should not breathe dust, wash thoroughly after handling.

Conditions for safe storage, including any incompatibilities

Keep in its original packaging, tightly closed when not in use. Do not store together with food products. Do not store together with animal feed. Do not store together with: Acids, Bases. Keep container tightly closed and dry in a cool, well-ventilated place. Protect bags from physical damage. Store in dry areas between 20°C to 25°C, avoid contact in storage with incompatible materials. 1) Release or spill of material: ventilate area, clean personnel requires respiratory protection. Collect powdered materials and deposit them in sealed drums. Vacuum or sweep up remaining material (do not dry sweep) 2) Waste Disposal Method: Dispose of in a closed container or heavy bag: Material may be recycled or disposed of in accordance with federal, state, and local environmental regulations. This material may be regulated by CERCLA, TSCA, SARA, and/or RCRA regulations.

Specific end uses

See section 1.2

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

CSR Information

DNELS

Exposure route

Oral- Not required

Inhalation – No hazard identified

Dermal – No hazard identified



Transforming products to value.

PNECS (related to zinc Oxide)

Sweet water – 14.4 µg/L
Freshwater sediment – 146.9 mg/kg sediment dw
Marine water- 7.2 µg/L
Marine sediments – 162.2 mg/kg sediment dw
Food chain – No bioaccumulation potential
Microorganisms in wastewater treatment - 100 µg/L
Soil (agricultural) – 83.1 mg/kg soil dw
Air- No hazard identified

PNECS (related to Zinc Oxide)

Sweet water – 17.9 µg/L
Freshwater sediment – 182.8 mg/kg sediment dw
Marine water – 9 µg/L
Marine sediments – 201.9 mg/kg sediment dry weight
Food chain – No bioaccumulation potential
Microorganisms in wastewater treatment- 124.5 µg/L
Soil (agricultural) – 103.4 mg/kg soil dw
Air – No hazard identified

Exposure controls

Hygienic controls

Do not eat, drink or smoke during work time. After working hours and during work breaks, the affected areas of the skin should be thoroughly cleaned. Store work clothes separately. Do not inhale dust.

Personal protection

The eyes

Safety glasses (EN 166): safety glasses are recommended.

Skin and body

Clothing as usual in the chemical industry. Protective gloves (EN 374) Natural rubber gloves

Respiratory

Use a NIOSH approved particulate respirator if dust generation occurs.

Additional protection measures

Wash thoroughly after handling and before eating or drinking. Emergency showers and eyewash stations must be available. Educate and train employees in the safe use and handling of hazardous chemicals.

Appropriate engineering controls:

Technical conditions and measures at the process (source) level to prevent their release

Process enclosures of closed circuits or semi-enclosures when appropriate.
Local exhaust ventilation in furnaces and other work areas with dust and fume generation potential, extraction and dust extraction techniques (high efficiency 90 - 95%)



Containment of liquid volumes in sumps to collect / prevent accidental spills.

Technical conditions and measures to control dispersion from the source to the worker

- Cyclones / filters (to minimize dust emissions): efficiency: 70-90% (cyclones), 50-80% (dust filters), 85-95% (double stage, cassette filters)
- Dust control: ZnO dust must be measured in the air of the workplace (static or individual)
- Special attention to the general establishment and maintenance of a clean work environment, for example:
 - Cleaning process equipment and workshop.
 - Storage of finished product packaged in Zn in dedicated areas.

Organizational measures to prevent / limit emissions, dispersion and exposure

- In general, the integrated management system would include general industrial hygiene practices, for example:
 - Information and training of personnel in prevention of exposures / accidents.
 - Procedures for the control of personal exposure (hygiene measures).
 - Regular cleaning of equipment and floors, expanded instruction manuals for workers.
 - Process control and maintenance procedures.
 - Personal protection measures (see 8.2.2).

Individual protection measures, such as personal protective equipment:

The GES production for ZnO mentions the following in this regard:

- The use of gloves and protective clothing is mandatory (efficiency $\geq 90\%$)
- With normal handling, there is no personal respiratory protection (a breathing apparatus is necessary).
- If there is a risk of exceeding OEL / DNEL, use for example:
 - P1 half mask dust filter (75% efficiency)
 - P2 half mask dust filter (90% efficiency)
 - P3 half mask dust filter (95% efficiency)
 - Full dust filter mask P1 (efficiency 75%)
 - Dust filter filled with P2 mask (90% efficiency)
 - Dust filter filled with P3 mask (97.5% efficiency)
- Eyes: safety glasses are optional.
- Information training of workers and their staff and line managers focused on careful hygiene behavior.

Environmental Exposure Controls:

Technical conditions and measures at the process level to prevent their release

- Processing of enclosures and closed circuits or semi-locks when relevant and possible.
- Local exhaust ventilation in furnaces and other work areas with dust generation potential, dust extraction and removal techniques.
- Containment of liquid volumes in sumps to collect/prevent accidental spillage, acid solutions are treated with alkali. There is a high temperature in the surroundings of the calcination kilns.



Technical conditions at the site and measures to reduce or limit discharges, air emissions and land emissions

- On-site water treatment techniques can be applied to prevent releases to water (if applicable), for example: chemical precipitation, sedimentation and filtration (99 - 99.98% efficiency)
- Containment of liquid volumes in sumps to collect / prevent accidental spills.
- Air emissions are controlled through the use of baghouse filters and/or other air emission reduction devices, eg cloth (or bag) filters (up to 99% efficiency), wet scrubbers (from 50 to 99%efficiency). This can create a general negative pressure in the building.

Organizational measures to prevent / limit the release of the site.

- In general, emissions are controlled and avoided by implementing an integrated management system (for example, ISO 9000, ISO 1400X series or similar).
- Said management system must include general industrial hygiene practices, for example:
- Information and training of workers.
- Regular cleaning of equipment and floors.
- Process control and maintenance procedures.
- Treatment and monitoring of emissions to the outside air, and currents of exhaust gases (process and hygiene), in accordance with national regulations.
- Compliance with SEVESO 2, if applicable.

9. PHYSICAL AND CHEMICAL PROPERTIES

| | |
|-------------------------------------|---|
| Appearance | Solid powder |
| Color | White to yellowish white powder |
| Smell | Toilet |
| Molecular weight | 81.38 |
| Specific gravity | 5.4 – 5.8 (water=1) |
| Ph | 6.8 to 7.4 |
| Melting point/ Freezing point | ZnO is very stable. Fusion does not occur. No exothermic or endothermic peaks are observed. No oxidation or decomposition was observed. |
| Boiling point | Irrelevant; The sample decomposes before boiling. |
| Flash point | Not applicable to inorganic substance (column 2 of annex VII of the REACH regulation) |
| Evaporation rate | Not applicable to solids. |
| Inflammability | All grades of zinc dust should not be considered flammable. |
| Lower flammable or explosive limits | Does not apply |
| Upper flammable or explosive limits | Does not apply |

| | |
|--|--|
| Vapor pressure | Not applicable if the melting point is above 300°C (Column 2 of the REACH Regulation of Annex VII) |
| Relative density | The density of ZnO is 5.68 g/cm ³ |
| Soluble | In cases and acids. |
| Water solubility | The water solubility of Zn in ZnO is 2.9 mg/l |
| Partition coefficient: N-octanol/water | Not applicable if the melting point is above 300°C (Column 2 of the REACH Regulation of Annex VII) |
| Autoignition temperature | The substance is not self-igniting |
| Decomposition temperature | Does not apply |
| Goo | Does not apply |
| Explosive properties | Zinc oxide does not have flammability, explosiveness or self-ignition properties. |
| Oxidizing properties | Not available |

10. STABILITY AND REACTIVITY

Reactivity Not available

chemical stability Thermal stability

Possibility of hazardous reactions

Zinc oxide can absorb carbon dioxide from the air to form zinc carbonate.

Conditions to Avoid

Zinc oxide is stable in closed containers at room temperature under routine storage and handling conditions. It can absorb carbon dioxide from the air to form zinc carbonate.

incompatible materials

acidsBases

hazardous decomposition products

ZnO-fume can be generated during thermal processing.

11. TOXICOLOGICAL INFORMATION

Information on the hazard classes defined in Regulation (EC) No. 1272/2008

Acute toxicity: classification criteria are not met

| Constitution | CAS No. | predicted values | Dose/concentration effects | Species | Method |
|--------------|-----------|---------------------|------------------------------|---------|--------------|
| Zinc oxide | 1314-13-2 | Acute oral toxicity | LD50 >2000 mg/kg body weight | Rat | OECD 401 and |

| | | | | | |
|------------|-----------|---------------------------|------------------------------|-----|----------|
| | | | | | OECD 423 |
| Zinc oxide | 1314-13-2 | Acute inhalation toxicity | LC50 >5.7mg/L | Rat | OECD 403 |
| Zinc oxide | 1314-13-2 | Acute dermal toxicity | LD50 >2000 mg/kg body weight | Rat | OECD 402 |

Skin corrosion/irritation - classification criteria are not met

| Constitution | CAS No. | Method | Species | Via | Outcome |
|--------------|-----------|-----------------------------|---------------|---------------|----------------|
| Zinc oxide | 1314-13-2 | Loser, 1977; Lansdown, 1991 | Not available | Not available | not irritating |

Serious eye damage/irritation - classification criteria not met

| Constitution | CAS No. | Method | Species | Via | Outcome |
|--------------|-----------|----------|---------------------------|---------------|----------------|
| Zinc oxide | 1314-13-2 | OECD 405 | New Zealand white rabbits | Not available | not irritating |

Skin sensitization: classification criteria are not met

| Constitution | CAS No. | Method | Species | Via | Outcome |
|--------------|-----------|----------|-------------|---------------|-----------------|
| Zinc oxide | 1314-13-2 | OECD 406 | Guinea pigs | Not available | not sensitizing |

Carcinogenicity

| Constitution | CAS No. | Method | Species | Via | Outcome |
|--------------|-----------|---------------|---------------|---------------|---|
| Zinc oxide | 1314-13-2 | Not available | Not available | Not available | Adequate experimental studies in animals are not available to evaluate the carcinogenicity of zinc compounds in humans. |

Germ cell mutagenicity: classification criteria are not met

| Constitution | CAS No. | Method | Species | Via | Outcome |
|--------------|-----------|---------------|---------------|---------------|--|
| Zinc oxide | 1314-13-2 | Not available | Not available | Not available | Based on the weight of evidence from existing available in vitro and in vivo genotoxicity assays, it is concluded that substances in the zinc category do not have biologically relevant |

| | | | | | |
|--|--|--|--|--|---|
| | | | | | genotoxic activity. Consequently, no classification for germ cell mutagenicity applies. This conclusion is in line with those reached by other regulatory reviews of the genotoxicity of zinc compounds (WHO, 2001; SCF, 2003; EU RAR, 2004, MAK, 2009). Therefore, no classification or mutagenicity labeling is required. |
|--|--|--|--|--|---|

Reproductive toxicity: classification criteria are not met

| Constitution | CAS No. | Method | Species | Via | Outcome |
|--------------|-----------|---------------|---------------|---------------|---|
| Zinc oxide | 1314-13-2 | Not available | Not available | Not available | Neither impairment of fertility nor developmental toxicity of zinc-category substances are considered endpoints of concern for humans. Based on the information available in experimental animals as well as in humans, there is no reason to classify any of the substances in the zinc category for their reproductive toxicity according to regulation (EC) 1272/2008. |

Specific Target Organ Toxicity – STOT-single exposure

| Constitution | CAS No. | Method | Species | Via | Outcome |
|--------------|-----------|---------------|---------------|---------------|---|
| Zinc oxide | 1314-13-2 | Not available | Not available | Not available | Of importance to humans is the occurrence of metal fume fever following exposure to ultrafine particles of special grades of zinc oxide in the context of very specific operations, such as cutting or welding galvanized |

| | | | | | |
|--|--|--|--|--|---|
| | | | | | <p>steel. However, in light of responsible care and since there are no studies available that would allow a NOAEL for metal fume fever to be established with a reasonable degree of certainty, a LOAEL (5 mg ZnO/m³) for 2 hours (showed symptoms typical of metal fume fever starting 4 to 8 hours after exposure and disappearing within 24 hours) can be used for metal fume fever according to the study by Gordon et al. (1992).</p> |
|--|--|--|--|--|---|

Specific target organ toxicity - STOT - repeated exposure - Animal data - classification criteria are not met

| Constitution | CAS No. | Method | Species | Via | Outcome |
|--------------|-----------|---------------|---------------|---------------|---|
| Zinc oxide | 1314-13-2 | Not available | Not available | Not available | There is insufficient evidence in animals or humans for specific target organ toxicity (repeated oral exposure/inhalation). In accordance with the criteria of regulation (EC) 1272/2008, none of the substances in the zinc category are classified as Specific toxicity in certain organs by repeated exposure (STOT-RE). |

Aspiration hazard

| Constitution | CAS No. | Method | Species | Via | Outcome |
|--------------|---------|--------|---------|-----|---------|
|--------------|---------|--------|---------|-----|---------|

| | | | | | |
|------------|-----------|---------------|---------------|---------------|--|
| Zinc oxide | 1314-13-2 | Not available | Not available | Not available | No data available - not classifiable due to lack of data |
|------------|-----------|---------------|---------------|---------------|--|

Information about other hazards

Endocrine disrupting properties: The substance is not classified as an endocrine disruptor.

Zinc is essential and has no known endocrine disrupting properties

12. ECOLOGICAL INFORMATION

Toxicity

For zinc substances, the ecotoxicity reference values (ERVs) are based on the soluble ion, Zn²⁺, and are determined from extensive data sets on acute and chronic ecotoxicity tests of soluble zinc salts.

Acute aquatic toxicity

The available high-quality data were normalized towards two sets of physicochemical conditions, reflecting the required range of pH. Such normalization is possible because for zinc, there are well-established bioavailability models (so-called "Biotic Ligand Models" or BLMs) for algae, invertebrates, and fish, which allow the prediction of acute and chronic zinc ecotoxicity as a function of conditions. physicochemistry of the test. The Zinc Acute Aquatic Toxicity Database contains data on 59 species (5 algae, 29 invertebrates, 21 fish species, 3 amphibians, and 1 aquatic plant). The Zinc Chronic Aquatic Toxicity Database contains high-quality data on 41 species (17 taxa).

| | final point | | Zn ⁺⁺ ion Concentration | Species |
|---------------------|-------------|------|------------------------------------|---------------------------------|
| acute ecotoxicity | NOEC | pH 6 | 154 µgZn/l | daphnia magna |
| | NOEC | pH 8 | 41 µgZn/l | Pseudokirchneriella subcapitata |
| chronic ecotoxicity | NOEC | pH 6 | 99 µgZn/l | Pseudokirchneriella subcapitata |
| | NOEC | pH 8 | 11 µgZn/l | Pseudokirchneriella subcapitata |

sediment toxicity

| Final point | value range | Data source | PNEC bridging method |
|-------------|---------------------|-------------------|----------------------------------|
| NOEC/ EC10 | 218 to 1101 µg Zn/l | 7 benthic species | Species Sensitivity Distribution |

Toxicity to microorganisms in STP

| Final point | Worth | Testing method | Data source | PNEC bridging method |
|-------------|------------|-------------------------------|------------------------|--------------------------|
| NOEC | 100 µgZn/l | Nitrification Inhibition test | Juliastuti et al. 2003 | Evaluation factor FA = 1 |



Persistence and degradability

Biodegradation is not applicable to metals/inorganic substances. An analysis has been presented on the removal of zinc from the water column as a surrogate for persistence

bioaccumulative potential

Due to homeostatic control mechanisms, bioaccumulation is not relevant for essential elements in general and for zinc in particular.

Mobility in soils

| Constitution | CAS No. | Distribution | Type of transport | Parameter | Outcome | Method |
|--------------|-----------|--------------|-------------------|-----------|--------------------|----------|
| Zinc Oxide | 1314-13-2 | soil - water | Adsorption | Kp record | 3.24 (0.30 – 4.31) | OECD 106 |

Results of PBT and vPvB assessment

PBT and vPvB criteria are not applicable to inorganic substances

Endocrine disrupting properties

The substance is not classified as an endocrine disruptor. Zinc is essential and has no known endocrine disrupting properties

Other adverse effects

There is no available data.

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

SUBSTANCE DISPOSAL: Dispose of in accordance with all applicable local and national regulations. Use recovery/recycling when possible. Dispose of surplus and non-recyclable products through a licensed waste disposal contractor. Waste should not be released to the sewer system unless regulations allow it. CONTAINER DISPOSAL: Empty containers may contain hazardous waste. Do not cut, drill, or weld on or near the container. Labels should not be removed from containers until they have been cleaned. Contaminated containers should not be treated as household waste. Containers must be cleaned by appropriate methods. Be sure to comply with all local, state,

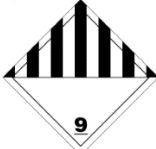
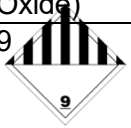


14. TRANSPORT INFORMATION

| | ADR/RID/GGVSE | IMDG | IATA/ICAO |
|-------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| Number one | UN 3077 | UN 3077 | UN 3077 |
| UN proper shipping name | ENVIRONMENTALLY HAZARDOUS SUBSTANCE, | ENVIRONMENTALLY HAZARDOUS SUBSTANCE, | ENVIRONMENTALLY HAZARDOUS SUBSTANCE, |



YELLOWBEE

Transforming products to value.

| | | | |
|--|--|---|--|
| | SOLID, NOS (Zinc Oxide) | SOLID, NOS (Zinc Oxide) | SOLID, NOS (Zinc Oxide) |
| Transport Class(es) | 9  | 9   | 9  |
| Packing group | II | II | II |
| Environmental hazards | Yes | Yes, Dangerous for the environment, marine pollutant. | Yes |
| Special precautions for user | 274/335/601 | 274/909/944 | A97 |
| Sort code | | M7 | |
| Hazard Identification No. | 90 | | |
| Bulk maritime transport in accordance with IMO instruments | The bulk transport of the merchandise is not foreseen. | | |

15. REGULATORY INFORMATION

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

This MSDS complies with the GHS-CLP rules.

Chemical Safety Assessment

A chemical safety assessment has not been carried out for this product.

16. OTHER INFORMATION

The information provided above is intended only as a guide to the appropriate precautionary handling of the material by properly trained personnel using this product. It is the responsibility of the customer and user to ensure it has in place provisions for the safe and proper handling of the material. Although YellowBee Packaging and Supplies Inc. believes the above information to be accurate based on the information available to YellowBee, it is the responsibility of the customer and user of the material to perform its own investigation and due diligence prior to use to verify that the product purchased from YellowBee meets their quality requirements and is appropriate for the use to which the product is to be put. Use and purchase of this material is subject to YellowBee Packaging and Supplies Inc. standard terms and conditions, which supersede any conflicting terms contained on Buyer's purchase order or any document or instrument supplied by Buyer.

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