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SAFETY DATA SHEET
ZINC OXIDE

SCOPE. This SDS is compliant with GHS and regulations for United States, Canada, Mexico, Brazil, Thailand, Singapore, etc. and most global jurisdictions.
This SDS is not valid where zinc oxide is listed as transportation regulated which includes, but not limited to, European Union member states, P.R.C., and Japan.

Section 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product Identifier / Product name: ZINC OXIDE

Product Code: This SDS is valid for all zinc oxide product codes or grades

1.2 Relevant identified uses of the substance/mixture and uses advised against:

Common uses include:

- Rubber compound
- Coloring agents, pigments
- Food/feedstuff additives
- Fuels and fuel additives
- Intermediates
- Laboratory chemicals
- Lubricants and lubricant additives
- Plating agents and metal surface treating agents
- Process regulators, other than polymerization or vulcanization processes
- Component in batteries
- Corrosion inhibitors and anti-scaling agents
- Fertilizers
- Pharmaceutical substance
- Photosensitive agents and other photo-chemicals
- Process regulators, used in vulcanization or polymerization processes
- Processing aid, not otherwise listed
- Semiconductors

No uses advised against

1.3 Manufacturer/Supplier of the safety data sheet: (website: www.zochem.com)

Zochem LLC (South Plant) (Responsible Party)	Zochem ULC (North Plant)
600 Printwood Drive, Dickson, TN 37055 U.S.A.	1 Tilbury Court, Brampton, ON, Canada, L6T 3T4
Phone: +1 615 446 8791	+1 800 324 1806
Contact: John Stourac +1 312-813-4620	Contact: Khalid Abdullah +1 905-453-4100 x4229

1.4 Emergency phone numbers (+1): 312-813-4620, 901-833-2118, 905-453-4100, 905-453-6477

Section 2: HAZARD IDENTIFICATION

2.1 Classification of the substance or mixture:

Zinc Oxide is not classified or hazardous for the jurisdictions covered by this SDS (see above scope). GHS markings are not required.

Section 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Constituent/Ingredient	Range	CAS no.	EC/EINECS	Other
Zinc Oxide (ZnO)	99-100.0%	1314-13-2	215-222-5	

3.2 Additional information of impurities:

Contains naturally occurring inorganic impurities less than SDS reporting de minimis.
Product may contain processing aid at customer request.
After manufacturing, during material handling and storage, the hygroscopic ZnO product absorbs some moisture from humidity in air, and product also slowly degrades with CO_2 in air forming zinc carbonate.

Section 4: FIRST AID MEASURES

4.1 Description of first aid measures:

In case of skin contact: Wash with soap and water.
In case of eye contact: Rinse with plenty of water and seek medical advice.
In case of Ingestion: Drink plenty of water; do not induce vomiting; call a physician.
In case of Inhalation: Move to fresh air. Keep warm and at rest.

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

Acute: Dry cough, headache. Chronic: None (overexposure has no lasting effects).

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

Condition: Bad cough or headache. Treatment: Move person to fresh air. No special treatment known.

Section 5: FIRE-FIGHTING MEASURES

Zinc oxide will not burn.
Hazardous decomposition product(s): None.
Use extinguishing media appropriate for the surrounding fire.
Avoid release of fire control water containing zinc oxide to the environment.

Section 6: ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures:

Wear protective clothing, dust respirator, and goggles in bulk excess dust conditions.
Shovel up spills into appropriate labeled container.
Dry spills, not mixed with other chemicals, may be recyclable. Contact ZNO LLC.

6.2 Environmental precautions:

Avoid release to the environment.

6.3 Methods and material for containment and cleaning up:

Recover the product by vacuum.
If sweeping unavoidable, use soft bristles to reduce creation of airborne dust.

Section 7: HANDLING AND STORAGE

7.1 Precautions for safe handling:

Wear protective clothing, dust respirator, and goggles in bulk excess dust conditions.

7.2 Conditions for safe storage, including any incompatibilities: Keep dry.

Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters:

United States (Ingredient name: Zinc oxide)

NIOSH REL (United States, 10/2013). CEIL: 15 mg/m³ Form: Dust TWA: 5 mg/m³ 10 hours. Form: Dust & fumes	OSHA PEL (United States, 2/2013). TWA: 5 mg/m³ 8 hours. Form: Fume TWA: 5 mg/m³ 8 hours. Form: Respirable fraction TWA: 15 mg/m³ 8 hours. Form: Total dust STEL: 10 mg/m³ 15 minutes. Form: Respirable fraction
ACGIH TLV (United States, 4/2014). STEL: 10 mg/m³ 15 minutes. Form: Fume TWA: 2 mg/m³ 8 hours. Form: Respirable fraction	

Canada (Ingredient name: Zinc oxide)

	TWA (8 hr) mg/m3	STEL (15 min) mg/m3	Note
US ACGIH 4/2014	2	10	Respirable fraction
AB 4/2009	2	10	Respirable
BC 7/2013	2	10	Respirable
ON 1/2013	2	10	Respirable fraction
QC 1/2014	5	10	fume

Mexico (Ingredient name: Zinc oxide)

NOM-010-STPS (Mexico, 9/2000). LMPE-PPT: 10 mg/m³ 8 hours. Form: powder LMPE-CT: 10 mg/m³ 15 minutes. Form: smoke LMPE-PPT: 5 mg/m³ 8 hours. Form: smokeNON-010

8.2 Personal Protection Exposure controls

Route(s) Of Entry: 1. Inhalation. 2. Dermal. 3. Eyes. 4. Digestion.
Eye protection: Recommend safety glasses in bulk dusk conditions.
Protection for skin: Recommend long sleeves in bulk dust conditions.
Protection for hands: Recommend gloves to reduce drying of skin
Respiratory protection: Recommend dust filter mask in bulk dust conditions.
(Must wear respirator of proper type if exposure above 8 hour TWA PEL)

8.2.1 Appropriate engineering controls: Use local exhaust ventilation.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance at 20°C and 1013 hPa:	Solid, powder or pellet/granular
Odor / smell:	Odorless.
Odor threshold:	Not applicable.
Color:	White, off white, cream, grayish, or yellowish.
pH:	Neutral, 6.8 to 8 (7.37 nominal)
Vapour pressure:	Not applicable (melting point above 300°C).
Vapour density:	Not applicable.
Relative density/Specific Gravity:	5.68 g/cm3.
Water solubility:	Negligible (solubility of Zn in ZnO is 2.9 mg/l).
Soluble:	In bases and acids
Boiling point:	Not applicable; the substance decomposes before boiling.
Flash point:	Not applicable to inorganic substances.
Evaporation rate:	Not applicable to solids

Flammability:	Not flammable. Will not burn.
Auto-ignition temperature:	The substance is not auto-flammable.
Upper / lower flammability limits:	Not applicable.
Upper / lower explosive limits:	Not applicable.
Melting / Freezing point:	Will not freeze. Will not melt. Malleable above 300C/572F No exothermic or endothermic peaks are observed. No oxidation or decomposition was observed. Sublimation temperature 1975C.
Partition coefficient n-octanol-water:	Not applicable to inorganic substance.
Decomposition temperature:	Not applicable.
Viscosity:	Not applicable.
Explosive properties:	Zinc oxide has no flammability, explosive or self-flammability properties
Granulometry:	D50 1.05 µm, D80 <20 µm
Molecular Weight:	81.38 (ZnO)

Section 10. STABILITY AND REACTIVITY

10.1	Reactivity:	Stable under normal dry air conditions.
10.2	Chemical stability:	Product is stable.
10.3	Possibility of hazardous reactions:	None.
10.4	Conditions to avoid:	Keep from getting wet (will damage substance usefulness).
10.5	Incompatible materials:	Heated magnesium. Chlorinated rubber above 215C.
10.6	Hazardous decomposition:	None.
10.6.1	Decomposition:	Product decomposes in acids and bases.
10.6.2	Degradation:	Slow degrade to zinc carbonate (not hazardous).*

*ZnO degrades with CO^2 (in ambient air) to $ZnCO^3$ zinc carbonate. Rate is accelerated with higher m^2/g surface area or damp storage conditions. Shelf life one year from date of manufacturing (dom) for grades >= 8.0 m^2/g surface area, and all rubber applications. Shelf life is eighteen months from dom for all other grades and applications. Rubber is particularly sensitive to $ZnCO^3$ hard white particulates not dispersing.

Section 11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects for zinc oxide:

Acute toxicity:*

Result	Species	Dose	Exposure	Refs
LC50 Inhalation Dusts and mists	Rat	>5.7 mg/L >5700 mg/m3	4 hours	Klimisch and Freisberg (1982)
LD50 Oral	Rat	15000 mg/kg	NA	Löser (1972)
LD50 Oral	Rat	>5000 mg/kg	NA	Löser (1977)

*With LD_{50} values consistently exceeding 2,000 mg/kg bw, slightly soluble compounds such as, zinc oxide (LD_{50} ranges between 5,000 and 15,000mg/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 (i.e., LC50 values of > 5.7 mg/L/4hrs), not leading to classification for acute inhalation toxicity.

Skin: Not irritant (rabbit; Löser, 1977; Lansdown, 1991)
Eye: Not irritant (rabbit; Van Huygevoort, 1999e; Thijssen, 1978; Löser, 1977)
Respiratory tract: Not irritant (Klimi-sh et al, 1982)
Ingestion: Not irritant (zinc oxide is used as a human vitamin supplement).
Sensitization: No sensitizing effects known (Van Huygevoort, 1999 g, h)
Germ cell mutagenicity: No biologically relevant genotoxic activity.
Carcinogenicity: Not a NTP/IARC carcinogen.
Reproductive toxicity: No evidence of reproduction toxicity.
Specific target organ toxicity (repeated exposure): None. (Lam et al, 1985, 1988; Conner et al. 1988).
Specific target organ toxicity (single exposure): None. (Heydon and Kagan, 1990; Gordon et al., 1992; Mueller and Seger, 1985).

Section 12: ECOLOGICAL INFORMATION

12.1 Toxicity:

Acute EC50 0.413 mg/l Zn, 48 hour – Ceriodaphnia dubia
Acute LC50 0.136 mg/l Zn, 72 hour – Selenastrum capricornutum

62% solubilisation capacity at 1 mg/l at pH 8:
for pH <7: 0.67 mg Zn/l (based on 48 hr Ceriodaphnia dubia test cfr. above).
for pH >7-8.5: 0.21 mg Zn/l (based on 72 hr Selenastrum capricornutum test cf. above)

12.2 Persistence and degradability: N/A, zinc is an element
12.3 Bioaccumulative potential: N/A, ZnO does not bioaccumulate or biomagnify
12.4 Mobility in soil: N/A
12.5 Results of PBT and vPvB assessment: N/A, zinc oxide is not PBT or vPvB.
12.6 Other adverse effects: None

13. DISPOSAL CONSIDERATIONS

13.1 USEPA law: Waste zinc oxide must be TCLP testing to determine proper disposal classification. Substance will generally pass TCLP.
State law: Material may be regulated locally as industrial or special waste.
Recyclable: Waste material not co-mingled with other substances may be recyclable. Contact Zochem for further information. This material, if sent for recycling, is exempt from U.S. Federal, State, and local waste regulations and TRI transfer reporting.
Empty used packaging is not regulated waste.

Section 14. TRANSPORT INFORMATION

Zinc Oxide is not classified or hazardous for the jurisdictions covered by this SDS (see above scope). GHS markings are not required.

Section 15. REGULATORY INFORMATION

15.1 U.S. Regulations:
Transportation: Not transport regulated in the U.S. (USDOT 49CFR172), Canada, or Mexico.
HS Tarriff Class #: 2817.00.0000, preference B
SARA 302: Name listed (zinc). RQ=None, TPQ=None.
SARA 312: Yes, acute hazard, EPCRA Tier 2 must be filed with state and local agencies.
SARA 313: Yes, TRI on Form R must be filed for Zn & Pb Compounds if usage above threshold.
CA Prop. 65: No, ZnO is not a Prop 65 listed substance. Impurities Pb & Cd listed.
CAA 112, 61 HAP: No, not regulated, no Hazardous Air Pollutants (HAP's)

FIFRA 152 et seq.: No, product is not subject to FIFRA registration.
CERCLA 102/103: Zinc is on Name List, RQ=None.
CONEG: Compliant.
ODS/ODC 82: No ozone depleting substances.
USFDA: Approved by FDA. Substance is listed as GRAS at 21CFR182.8991 (GRAS=Generally Recognized as Safe) and may be used in any FDA regulation where use of a GRAS substances is authorized including an ingredient in food and in food contact in rubber articles at 21CFR177.2600(c)(1); Food can linings and coatings at 21CFR175.300(b)(2), and Plastics at 21CFR170.30(d).

15.2 TSCA and equivalent inventories/lists:

TSCA (U.S.): Yes, listed, active, notification not required.
DSL (Canada): Yes, listed. NDSL: (Canada): No, not listed, notification not required.
EINECS (Europe): Yes, on Inventory. ELINCS (Europe): No, notification/reporting not required.
Listed on other inventories which include: ASIA-PAC, SWISS, PICCS (Philippines), ENCS (Japan), AICS (Australia), KECI (Korea), IECSC (China), New Zealand, Taiwan.

15.3 European Economic Area (EEA) Regulations:

15.1 EU REACH OR: Reach Only Representative (Ireland) Ltd. Registration: number: 01-2119463881-32-0065 (Zochem ULC, Canada), 01-2119463881-32-0201 (Zochem LLC, USA). OR contact: 44(0) 1565 748111, email: alerts@RORltd.com, Website www.rorltd.com

Transportation: This product is listed by EU regulation as transport regulated in EU/EEA member countries by EU regulations.

SVHC: Zinc oxide is not an SVHC. Impurities are below SVHC or candidate SVHC thresholds.

Nano: This product is not nano (per definition of nano as 50% particles <=100nm).

Section 16. OTHER INFORMATION

16.1 HMIS Hazard Rating (Paint and Coating Industry)

Health	1 (slight)
Flammability	0
Reactivity	0
Personal Protection	E (mask, gloves, and goggles are recommended in bulk dust conditions)

16.2 This SDS provides information to work safety with ZnO substance. It is not a performance or property guarantee. The information is believed accurate utilizing reasonably available published data. We are not responsible for any inadvertent error or omission.