



SAFETY DATA SHEET

PRODUCT NAME: ZINC OXIDE (ALL GRADES)
 EFFECTIVE DATE: 20 FEBRUARY 2019
 SCOPE: THIS SDS IS VALID FOR ALL ZINC OXIDE PRODUCT GRADES SOLD BY US ZINC

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

1.1 Product Identifier

Trade Name: Zinc Oxide
Synonyms: ZINKOXID, OXYDE DE ZINC, OSSIDO DI ZINCO, ZINKOXIDE, ZINK OXID, OXIDO DEL CINC, TLENED CYNKU
CAS number: 1314-13-2
EINECS number: 215-222-5
Reach Registration: 01-2119463881-32-0075 (Tonnage Band >1000 t/yr)

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

In EEA member countries, use is restricted to only uses registered under REACH.

- Colouring agents, pigments
- Food/feedstuff additives
- Fuels and fuel additives
- Intermediates
- Laboratory chemicals
- Lubricants and lubricant additives
- Plating agents & metal surface treating agents
- Process regulators, component in batteries
- Corrosion inhibitors and anti-scaling agents
- Fertilisers
- Pharmaceutical substance
- Photosensitive agents & photo-chemicals
- Process regulators, used in vulcanisation or polymerisation processes
- Processing aid, not otherwise listed
- Semiconductors

1.3 Details of the supplier of the data sheet

Supplier Address U.S. Zinc Corporation 2727 Allen Parkway; Suite 800 Houston TX 77019	Supplier Phone +001 713 926 1705	Supplier Contact John Williams	
	Supplier Fax +001 713 924 4829	Contact Email HSE@USZinc.com	Contact Phone +001 281 840 5376

1.4 Emergency Contact

Phone Number: +001 888 298 3509
 +001 760 602 8703
 Use Client Code 10381

1.5 REACH Only Representative

(OR): Chemservice GmbH
OR Address: Herrnsheimer Hauptstr. 1b | 67550 Worms | Germany
OR contact person: Thomas Kremer, email: tkremer@chemservice-group.com
Tel: +352 270776 62
www.chemservice-group.com

2 HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

2.1.1 U.S.A.: Not Regulated

2.1.2 EEA member countries: Regulated

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

Aquatic Acute 1: H400

Aquatic Chronic 1, H410

2.1.2.2 Classification according to Directive 67/548/EEC

Dangerous for the environment; N; R50-53

2.1.2.3 Additional Information

For full text of R-phrases and Hazard- and EU Hazard-statements: see Section 16.

2.2 GHS Labeling

Zinc Oxide. Signal word: Warning.

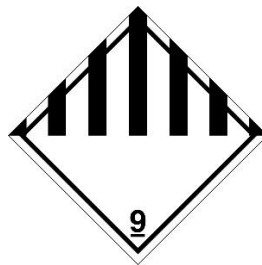
H410: Very toxic to aquatic life with long lasting effects.

P273: Avoid release to the environment.

P391: Collect spillage.

P501: Dispose of contents/container as hazardous or special waste in accordance with applicable law.

– These warning labels only apply outside of USA unless transported by air or sea



GHS PRECAUTIONARY STATEMENTS

Hazard category

1

Signal word

Warning

Hazard statement

Very toxic to aquatic life with long lasting effects.

Pictogram



Precautionary statements:

Prevention	Response	Storage	Disposal
Keep only in original container or in similar tightly sealed container	Absorb spillage to prevent material damage.	Store in tightly sealed container	Disposal as per local, state or federal regulations. Avoid water contamination

3 COMPOSITION/INFORMATION ON INGREDIENTS

Component Name	CAS#	EC#	% Composition	Type
Zinc Oxide (ZnO)	1314-13-2	215-222-5	95%-100%	Main
Lead (PbO)			<0.15%*	Impurity
Cadmium (CdO)			<0.25%*	Impurity

Note: all other constituents are found at trace levels or are not regulated. See individual product specifications for specific composition limits.

*- All grades are below these values but some have lower limits

4 FIRST AID MEASURES**4.1 Description of first aid measures**

Skin Contact	Immediately wash with soap and water. Seek medical attention if irritation occurs.
Eye Contact	Immediately flush eyes with plenty of water. Get medical attention if irritation occurs.
Ingestion	Drink plenty of water. Do not induce vomiting. Seek medical attention or contact Poison Control.
Inhalation	Remove victim to fresh air. Seek medical attention if feeling unwell or experiencing respiratory distress

4.2 Most important symptoms and effects, both acute and delayed

Acute: Dry cough, headache, throat irritation
Delayed: No delayed symptoms or effects expected

4.3 Indication of any immediate medical attention and special treatment needed

Bad cough, headache, and/or nausea. Move effected individual to fresh air.

5 FIRE-FIGHTING MEASURES**5.1 Extinguishing Media**

Suitable Extinguishing Media	Use an extinguishing media suitable for the surrounding fire
Unsuitable Extinguishing media	None Known

5.2 Special hazards arising from the substance or mixture

Hazards from the substance	Water contaminated with this material must be contained and prevented from being discharged to environment
Hazardous thermal decomposition products	Decomposition products may include Zinc Oxide fumes at high temperatures

5.3 Advice for fire-fighters

Special protective actions for fire-fighters	No special measures required
Special protective equipment for fire-fighters	Suitable breathing apparatus

6 ACCIDENTAL RELEASE MEASURES

6.1 Personal Precautions

Avoid breathing dust. Refer to Section 7 and Section 8 for advice on handling/storage and PPE

6.2 Environmental Precautions

Prevent contamination of soil, drains, and surface water. Inform relevant authorities of spill where required.

6.3 Spill Cleanup Recommendation

Avoid dry sweeping or other methods which raise dust. Vacuum or wet-sweep and place into a suitable closable, labeled container for disposal. Dispose of waste via licensed waste disposal contractor.

7 HANDLING AND STORAGE

7.1 Precautions for Safe Handling

This product should be used in accordance with good industrial safety practices and industrial hygiene standards and all local, state, federal, and international regulations. Avoid creating airborne dust. Ensure adequate exhaust ventilation. Workers who handle material should wear gloves and thoroughly wash hands/forearms after exposure. See Section 8.2 if exposure exceeds limits.

7.2 Conditions for Safe Storage/Instabilities

This product should be stored in accordance with all local, state, federal and international regulations. Store under ambient conditions and keep packaging free from high moisture areas in a well-ventilated space sealed tightly in the original containers. Once original containers are opened, all product must be used or remaining product placed in tightly sealed containers. Protect containers from damage and repair if damage occurs. If product is shipped in IBC bulk packaging, the inner plastic liner may be closed tightly and be considered a closed container. Use all product within 1 year of shipping date.

8 EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control Parameters

Product/Ingredient Name	8 Hour- TWA (mg/m ³)	15 min-STEEL (mg/m ³)	References
USA	5 (Fumes) 10 (Dust)	10 (fumes)	ACGIH (1991) (guidance values)
USA	5 (Fumes) 15 (Dust; total) 5 (Dust; respirable)		OSHA (1989) (legal limit values)
The Netherlands	5 (Fumes)		SZW (1997)
Germany	5 (Fumes) 6 (Dust)		DFG (1997)
UK	5 (Fumes) 10 (Dust)		HSE (1998)
Sweden	5 (Fumes)		National Board of Occupation Safety and Health, Sweden (1993)
Denmark	4 (Fumes) 10 (Dust)		Arbejdstilsynet (1992)

8.2 Exposure Controls

Respiratory Protection	Avoid creating dust. If exposure levels exceed limits, respiratory protection approved for the work being performed must be worn.
Hand Protection	Always wear glove approved for the work being performed when handling Zinc Oxide.
Skin Protection	Wear normal chemical work clothing.
Eye Protection	Always wear approved protective eyewear if there is a potential for dust being created while handling the material.
General Protective Hygiene Measures	Use local exhaust ventilation to pro-actively reduce dust levels.

8.3 Other

Route(s) of entry	Inhalation and mechanical irritation of eyes and skin
Carcinogen Status	Not a NTP/IARC carcinogen
Signs and symptoms of exposure	Dry throat, cough, and dry itchy skin
Notes	Excess bulk exposure may cause acute respiratory irritation or dry skin

9 PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance:	White, cream, or yellow	Solubility in water:	2.9 mg/L
Typical Particle Size:	d50 typically 1 um	Boiling Point:	n/a
Flammability Limits:	ZnO is not flammable	Flash Point:	Not flammable
Explosive Limits:	ZnO is not explosive	Evaporation Rate	n/a
Odor:	Odorless	Specific Gravity:	5.68
Vapor Pressure:	@1500C = 12 mm HG	Molecular Weight:	81.38
Odor Threshold:	Odorless	Suggested Solvents:	Acids and bases
Vapor Density:	n/a	Fire qualities:	Will not burn
pH:	Neutral	Explosive Qualities:	Not explosive
Relative Density:	Varies	Volatile:	0.3% nominal
Melting point:	1975 °C		

10 STABILITY AND REACTIVITY

Reactivity	Stable under normal, dry conditions
Chemical stability	This product is stable
Possibility of hazardous reactions	None
Conditions to avoid or incompatible materials	Heated magnesium. Chlorinated rubbers above 215C
Hazardous decomposition products	Potential for ZnO fumes at elevated temperatures

11 TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Routes of Entry	Oral, Inhalation
Acute Toxicity	LD ₅₀ (rat, Inhalation): 7,950 mg/kg (Encyclopedia of Toxicology: Reference Book 2005)
Chronic Toxicity	NOAEL: 50 mg/day (based on human clinical studies)
Mutagenicity	No data available
Carcinogenicity	No data available. Not listed as an IARC Carcinogen. Not listed in the NTP report on carcinogens.

11.2 Acute Exposure Symptoms

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 respiratory tract
Skin Contact	No known significant effects or critical hazards
Ingestion	No known significant effects or critical hazards

12 ECOLOGICAL INFORMATION

12.1 Toxicity

Product Name	Result	Species	Dose	Exposure	Reference
Zinc Oxide	LC50 Inhalation Dusts and mists	Rat	>5.7mg/L	4 Hours	Klimisch and Freisberg (1982)
Zinc Oxide	LD50 Oral	Rat	15000 mg/kg	N/A	Löser (1972)
Zinc Oxide	LD50 Oral	Rat	>5000 mg/kg	N/A	Löser (1977)

12.2 Persistence and degradability

Not rapidly degradable

12.3 Bioaccumulative potential

No evidence to indicate significant bioaccumulative potential

12.4 Mobility in soil

No evidence to indicate significant mobility in soil

12.5 Results of PBT and vPvB assessment

ZnO is not PBT or vPvB.

12.6 Other adverse effects

None

13 DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Generation of product waste should be minimized wherever possible. Disposal of product, solutions, and any by-products should comply with the requirements of environmental protection and waste disposal legislation and any regional or local authority requirements. Dispose of surplus and non-recyclable products via licensed waste disposal contractor. Waste should not be released into sewer system unless regulations permit such release

Containers/Packaging

Generation of packaging waste should be minimized wherever possible. Waste packaging should be recycled when possible. Incineration and/or landfill dumping should only be considered when recycling isn't feasible. Make sure to follow all local, state, federal, and international regulations when disposing of packaging materials.

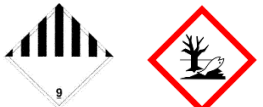


14 TRANSPORTATION INFORMATION

14.1 US Information

NAFTA Tariff Class	2817.00.0000, Sched. B.
Country of Origin	U.S.A.
Responsible party	U.S. Zinc, Houston Texas USA
Classification code	M7 (Formerly: Item Number 12C)
Hazard identification/reconnaissance #	90

NMFC Class	55
USDOT Information	This material is not regulated for USA, Mexico or Canada ground shipments

14.2 EU Information

	ADR/RID	IMDG	IATA
14.2.1 UN Number	UN3077	UN3077	UN3077
14.2.2 UN proper Shipping Name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (ZINC OXIDE)	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (ZINC OXIDE), MARINE POLLUTANT (ZINC OXIDE)	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (ZINC OXIDE)
14.2.3 Transport hazard Class(es)			
	Hazard Identification Number: 90	Sea (IMO): DG, MP	IATA Label: Miscellaneous
14.2.4 Packing Group	III	III	III
14.2.5 Environmental Hazards	Yes	Yes, Dangerous to the environment	Yes
14.2.6 Special precautions for users	No	No	Yes (see below)
Additional Information	Tunnel code (E)		
IATA special precautions for users	IATA- Passenger Aircraft:		400kg (packing group 956)
	IATA- Passenger Aircraft:		30kg (packing group Y956)
	IATA- Cargo Aircraft:		400kg (packing group 956)
	IATA-S.P.:		A97, A158, A179

*The EU diamond for Dangerous to the Environment has a red border. A copy of this document may not be in color resulting in the above border incorrectly being displayed in black.

15 REGULATORY INFORMATION

15.1 EEA

This SDS complies with GHS-CLP, and EEA/EUI REACH, HCS 2012 and SDS rules

15.2 TSCA Equivalent 'inventory' regulations

AICS	Yes
SWISS	Yes
PICCS	Yes
DSL	Yes

NDSL	No
ASIA-PAC	Yes
EINECS	Yes, on inventory
ELINCS	No, notification/reporting not required

15.3

USDOT	Not Transport regulated, 49CFR172
SARA 302	Yes, name listed (Zinc). RQ= None, TPQ= None
SARA311/312	Yes, acute hazard, 29CFR1200
SARA313	Yes, Zn & Pb compounds
CA Prop.65	Yes, Pb & Cd
CAA 112, 61 HAP	No, not regulated, no HAP's
FIFRA 152 et seq.	No (product is not subject to FIFRA)
CERCLA 102/103	Name List, RQ=None
NSF 60/61	Submitted NSF, UL
FCC	Listed
CONEG	Compliant
ODS/ODC 82	No
TSCA	Yes, on Inventory, Compliant with TSCA, Notification not required
RCRA 261	If governing spec is >1000 ppm Pb or >20 ppm Cd, product must be TCLP tested for Pb and Cd to determine if waste product is subject to RCRA
USFDA	Listed as GRAS at 21CFR182.8991

15.4 EU REACH Information

Product Origin – REACH ID	01-2119463881-32-0075 (Tonnage >1000 t/year)
P.R.C. Pre-Registration #	05-2114620034-66-0000
Brazil Pre-Registration #	05-2114626885-37-0000

16 OTHER INFORMATION**16.1 Safety Phrases S60 in additional languages:**

(FR): Eliminer le produit et son recipient comme un déchet dangereux.

(IT): Questo material e il suo contenitore devono essere smaltiti come rifiuti pericolosi.

(DE): Dieses Produkt und sein Behälter sind als gefährlicher Abfall zu entsorgen.

16.2 Safety phrases S61 in additional languages:

(FR): Eviter le rejet dans l'environnement. Consulter les instructions spéciales/la fiche de données de sécurité.

(IT): Non disperdere nell'ambiente. Riferirsi alle istruzioni speciali/ schede informative in material di sicurezza.

(DE): Freisetzung in die Umwelt vermeiden. Besondere Anweisungen einholen/ Sicherheitsdatenblatt zu Rate ziehen.

16.3 Risk phrases R50/53 in additional languages

(FR): Très toxique pour les organismes aquatiques, peut entraîner des effets néfastes à long terme pour l'environnement aquatique.

(DE) : Sehr giftig für Wasserorganismen, kann in Gewässern längerfristig schädliche Wirkungen haben.

(IT): Altamente tossico per gli organismi acquatici, può provocare a lungo termine effetti negativi per l'ambiente acquatico

16.4 Signal Word, H and P phrases in additional languages:**16.4.1 DE Deutsch (German).**

ZINKOXID. Signalwort: Achtung.

H410: Sehr giftig für Wasserorganismen mit langfristiger Wirkung.

P273: Freisetzung in die Umwelt vermeiden.

P391: Verschüttete Mengen aufnehmen.

P501: Diesen Stoff und seine(n) Behälter entsprechend geltendem Recht der Problemabfallentsorgung zuführen.

16.4.2 FR Français (French).

OXYDE DE ZINC. Mention d'avertissement: Attention.

H410: Très toxique pour les organismes aquatiques, entraîne des effets néfastes à long terme.

P273: Éviter le rejet dans l'environnement.

P391: Recueillir le produit répandu.

P501: Éliminer le contenu/récipient dans des déchets dangereux ou spéciaux conformément à la loi qui s'applique.

16.4.3 IT Italiano (Italian).

OSSIDO DI ZINCO. Avvertenza: Attenzione.

H410: Molto tossico per gli organismi acquatici con effetti di lunga durata.

P273: Non disperdere nell'ambiente. P391: Raccogliere il materiale fuoriuscito.

P501: Smaltire il prodotto/recipiente in conformità alla normativa vigente sui rifiuti speciali e pericolosi.

16.4.4 NL Dutch, Flemish (Dutch).

ZINKOXIDE. Signaalwoord: Waarschuwing.

H410: Zeer giftig voor in het water levende organismen, met langdurige gevolgen.

P273: Voorkom lozing in het milieu. P391: Gelekte/gemorste stof opruimen.

P501: Verwijder inhoud/container als gevaarlijk of bijzonder afval in overeenstemming met de geldende wetgeving.

16.4.5 ES Español (Spanish).

OXIDO DEL CINCO. Palabra de advertencia: Atención.

H410: Muy tóxico para los organismos acuáticos, con efectos nocivos duraderos.

P273: Evitar su liberación al medio ambiente.

P391: Recoger el vertido.

P501: Disponga del contenido/envase como basura peligrosa o especial de acuerdo con la ley aplicable.

16.4.6 DA Dansk (Danish).

ZINK OXID. Signalord: Advarsel.

H410: Meget giftig med langvarige virkninger for vandlevende organismer.

P273: Undgå udledning til miljøet.

P391: Udslip opsamles.

P501: Indholdet/beholderen bortskaffes som farligt affald i overensstemmelse med gældende regler.

16.4.7 PL Polish, Polska (Polish).

TLENED CYNKU. Hasło ostrzegawcze: Uwaga.

H410: Działa bardzo toksycznie na organizmy wodne, powodując długotrwałe skutki.

P273: Unikac uwolnienia do srodowiska.

P391: Zebrać wyciek. P501: Wyzuć pojemniki zawierające toksyczne i niebezpieczne substancje zgodnie z instrukcją

16.5 HMIS Hazard Rating (Paint and Coating Industry)

16.5.1 Health

1 (Slight)

16.5.2 Flammability

0

16.5.3 Reactivity

0

16.5.4 Personal Protection

E (in bulk dust conditions gloves, mask, and goggles are recommended)

16.6 CMS Hazard Rating (GHS)

Zinc Oxide. Signal word: Warning.

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

P273: Avoid release to the environment.

P391: Collect spillage.

P501: Dispose of contents/container as hazardous or special waste in accordance with applicable law.



16.7 Table: Identified uses for ZnO and corresponding Generic Exposure Scenarios (GES) as provided by studies conducted by the International Zinc Association (2016) Tables as listed:

Table 1. Generic exposure scenarios for zinc oxide

Number	Sector	Uses	Code
0	Zinc oxide production	Manufacture Substance	GES _{ZnO} 0
1	Formulation step	Formulation general	GES _{ZnO} 1
2	First tier applications	Manufacturing of other zinc compounds	GES _{ZnO} 2
3		Laboratory reagent	GES _{ZnO} 3
4		As component for solid blends & matrices	GES _{ZnO} 4
5		As component for production of dispersions, pastes and other viscous matrices	GES _{ZnO} 5
6	Second tier applications	DU of ZnO-containing solid preparations	GES _{ZnO} 6

7		DU of ZnO-containing liquid & pasty preparations	GES _{ZnO} 7
8	Generic wide dispersive use		GES _{ZnO} 8

Table 128 is specific for nano- ZnO that is not present in US Zinc product

Table 2. Identified uses for ZnO and corresponding Generic Exposure Scenario (GES)

Identified Use (IU) name	Brief description of use process	GES code
M-1: Zinc oxide production-Direct		GES _{ZnO} 0
M-2: Zinc oxide production-Indirect		GES _{ZnO} 0
M-3: Zinc oxide production-Wet		GES _{ZnO} 0
M-4: Zinc production nano		GES _{ZnO} 0
M-5: Zinc air batteries by-product		GES _{ZnO} 0
M-6: ZnO in electrotechnical contact material		GES _{ZnO} 0
F-1: Laboratory reagent	Use of Zinc oxide as active laboratory reagent in aqueous or organic media, for analysis or synthesis	GES _{ZnO} 3
F-2: Formulation dry mixture	Zinc Oxide is used in the formulation of dry preparations by mixing thoroughly the starting materials, with potentially pressing, pelletizing, sintering and packaging of the preparation.	GES _{ZnO} 1
F-3: Hand mixing of dry formulation	Industrial use of Zinc Oxide or ZnO-formulations for formulations of dry mixtures by hand-mixing, with potentially pressing, pelletizing, sintering and packaging of the preparation.	GES _{ZnO} 1

Identified Use (IU) name	Brief description of use process	GES code
F-4: Formulation in organic matrix	Zinc Oxide is used in the formulation of organic preparations or organic Zinc-substances by mixing the starting materials in a organic-based matrix, with potentially dispersing, pressing, injecting and packaging	GESZnO 1
F-5: Formulation as paste	Zinc oxide is used in the formulation of pastes by mixing thoroughly the starting materials, with liquids and packaging the preparation.	GESZnO 1
F-6: Formulations of water-based inorganic preparations	Zinc Oxide is used in the formulation of water-based preparations by mixing the starting materials in a water-based matrix, with potentially filtering and packaging	GESZnO 1
F-7: Nano ZnO use as laboratory reagent	Use of nano as lab reagent in various media for reserach, analysis or synthesis	GESZnO 1
F-8: Nano ZnO in dry formulation (powders)	Nano ZnO is used in formulations of dry preparations by mixing thoroughly the starting materials and further packaging.	GESZnO 1
F-9: Nano ZnO formulated in dispersions	Nano ZnO is used in the formulation of dispersions by mixing the starting materials in a water-based or organic matrix, with potentially filtering and packaging	GESZnO 1
F-10: Industrial distribution		GESZnO 1
F-11: Industrial USE to formulate fertilizers products mixtures		GESZnO 1
IW-1: Component for production of inorganic zinc compounds	Industrial use of Zinc Oxide or ZnO-formulations in the manufacture of other inorganic Zinc-substances, through	GESZnO 2

Identified Use (IU) name	Brief description of use process	GES code
	different process routes, with potentially drying, calcining and packaging	
IW-2: Component for production of organic zinc compounds	Industrial use of Zinc Oxide or ZnO-formulations in the manufacture of organic preparations or organic Zinc-substances by mixing the starting materials in a organic-based matrix, with potentially filtering or casting and packaging	GESZnO-2
IW-3: Component for production of Inorganic pigments	Industrial use of Zinc Oxide or ZnO-formulations as component for the manufacture of inorganic pigments and others.	GESZnO 4
IW-4: Component for production of Coatings / paints, inks, enamels, varnishes	Industrial use of Zinc Oxide or ZnO-formulations as component for the manufacture of paints and other coatings for i.e. metallic surfaces, wood products and others.	GESZnO 4
IW-5: Component for Paper coating	Industrial use of Zinc Oxide or ZnO-formulations as component for coatings and treatment preparations for paper products	GESZnO 5
IW-6: Additive / component for production of ceramics	Industrial use of ZnO or ZnO-formulations in manufacturing of ceramics	GESZnO 4
IW-7: Additive /component for production of frits	Industrial use of ZnO or ZnO-formulations in manufacturing of frits with pressing, melting, rapid cooling	GESZnO 4
IW-8: Additive for the production of friction agents in break pads	Industrial use of ZnO or ZnO-formulations, in manufacturing of friction agents	GESZnO 4
IW-9: Additive / component for production of glass	Industrial use of ZnO or ZnO-formulations in manufacturing of glass	GESZnO 4

Identified Use (IU) name	Brief description of use process	GES code
IW-10: Surface treatment of flat glass	ZnO can occasionally be formed at the surface of flat glass by induced coatings reactions	GESZnO 4
IW-11: Additive in the manufacturing of electronic components	Industrial use of ZnO or ZnO-formulations in manufacturing of electronic components and articles.	GESZnO 4
IW-12: Additive in the manufacturing of ferrites	Industrial use of ZnO or ZnO-formulations blending, pressing and sintering, for production of ferrites.	GESZnO 4
IW-13: Additive in the manufacturing of varistors	Industrial use of ZnO or ZnO-formulations for production of varistors.	GESZnO 4
IW-14: ZnO in electrotechnical contact material	ZnO can occur as induced component in electrotechnical contact material.	GESZnO 4
IW-15: Fuel cells - solar energy cells	Industrial use of ZnO or ZnO-formulations in manufacturing of fuel cells or solar energy cells.	GESZnO 4, GESZnO 5
IW-16: Component for production of rubber, resins and related preparations	Industrial use of ZnO or ZnO-formulations in manufacturing of rubber products	GESZnO 5
IW-17: Component for polymer-matrices, plastics, thermoplastics and related preparations	Industrial use of ZnO or ZnO-formulations in manufacturing of polymer matrices and plastic products	GESZnO 5
IW-18: Additive for the production of Sealants / Adhesives / Mastics	Industrial use of ZnO as additive in formulation of sealants and adhesives for metallic surfaces and wood products	GESZnO 5
IW-19: Additive for the production of Lubricants / Grease / Metal working fluids and other fluids	Industrial use of ZnO as additive in formulation of lubricants and greases	GESZnO 5

Identified Use (IU) name	Brief description of use process	GES code
IW-20: Additive for the production of Polishes / wax blends	Industrial use of ZnO as additive in formulation of polishes and wax blends	GESZnO 5
IW-21: Additive for production of de-icing products	Industrial use of ZnO for production of de-icing products	GESZnO 5
IW-22: Additive for the production of pyrotechnic products	Industrial use of ZnO for production of pyrotechnic products.	GESZnO 4
IW-23: Additive in the formulation of cosmetics	Industrial use of ZnO as an active component in the manufacturing of cosmetics preparations by mixing or blending of solid or liquid materials	GESZnO 4, GESZnO 5
IW-24: Component for Textile & leather coating / treatment	Industrial use of Zinc Oxide or ZnO-formulations as component for coatings and treatment preparations for textile and leather products	GESZnO 5
IW-25: additive in formulation of pharmaceutical or veterinary product	Industrial use of ZnO as an active component in the manufacturing of veterinary preparations by mixing or blending of solid or liquid materials	GESZnO 4, GESZnO 5
IW-26: Ancillary activity resulting in potential ZnO exposure: substrate preparation (sanding)	sanding of surfaces between application of coatings	GESZnO 6
IW-27: Additive in the manufacturing of solder products (pastes)		GESZnO 5
IW-28: Zinc production by electrowinning	Electrowinning uses an electrolytic cell to reduce the zinc. An electric current is run from a lead-silver anode through a zinc solution. The zinc deposits on an aluminum cathode and is harvested. The zinc is then melted and cast into ingots.	GESZnO 2

Identified Use (IU) name	Brief description of use process	GES code
IW-29: Zinc production by pyrometallurgy (distillation)	Industrial use of impure or recycled ZnO in the manufacture of pure Zinc metal. The smelting process is carried out in a furnace and condensor, with occasional controlled exposure	GESZnO 2
IW-30: Use of ZnO-containing paints & coatings	Industrial use of coatings and paints, thinners and paint removers containing ZnO .	GESZnO 7
IW-31: Use of ZnO containing paper coating	Industrial use of paper coatings containing ZnO.	GESZnO 6
IW-32: Use of ZnO containing textile & leather coating	Industrial use of leather & textile coatings containing ZnO.	GESZnO 7
IW-33: Use of ZnO containing glazes and glassy thin film coatings	Industrial use of ZnO-containing formulations in the glazing and other thin film coating process	GESZnO 6
IW-34: Use of ZnO in displays and LED		GESZnO 6
IW-35: Use of ZnO thin films	Industrial use of ZnO-containing thin film coatings	GESZnO 7
IW-36: Use of ZnO containing catalysts	Industrial use of ZnO containing catalysts. Zinc oxide is a constituent of many types of catalysts: it is present for its catalytic activity, its ability to absorb catalyst poisons (a.o.S and Cl) and as catalyst strength component.	GESZnO 5
IW-37: Use of ZnO as adsorbants		GESZnO 5
IW-38: Use of ZnO as nutrition additive/feedstuff	Industrial use of ZnO or ZnO-formulations for the production of nutrition additives. Zinc oxide is used in mineral premixes as a source of the essential trace element zinc.	GESZnO 4, GESZnO 5

Identified Use (IU) name	Brief description of use process	GES code
IW-39: Additive in biocidal products	Industrial use of ZnO for the production of biocidal products	GESZnO 4, GESZnO 5
IW-40: ZnO in soaps and detergents	Industrial use of ZnO for the production of cleaning products.	GESZnO 4, GESZnO 5
IW-41: ZnO as ingredient for dental cement	Industrial use of ZnO as an component in the manufacturing of dentistry dry matrices by mixing or blending of solid materials	GESZnO 2
IW-42: Nano ZnO (coated or uncoated) as UV filter in cosmetic emollients used for sunscreen, skin care and pharmaceutical preparations	Industrial use of nano ZnO as an active component in the manufacturing of sunscreen, skin care and pharmaceutical preparations by mixing or blending of solid or liquid materials	GESZnOnano 4 - 5
IW-43: Nano ZnO (coated or uncoated) as component for polymer-matrices, plastics, thermoplastics and related preparations	Industrial use of nano ZnO as an additive or active ingredient in the manufacturing of polymer-matrices, plastics, thermoplastics and related preparations by mixing or blending of solid or liquid materials	GESZnOnano 4
IW-44: Nano ZnO (coated or uncoated) used as additive in the manufacturing of electronic components	Industrial use of nano ZnO as an additive in the manufacturing of electronic components	GESZnOnano 5
IW-45: Nano ZnO (coated or uncoated) used as UV protectant in clear coatings		GESZnOnano 5
IW-46: Nano ZnO (coated or uncoated) used as transparent UV absorber in food contact materials		GESZnOnano 5

Identified Use (IU) name	Brief description of use process	GES code
PW-1: Use of ZnO-containing paints & coatings	Professional use of coatings and paints, thinners and paint removers containing ZnO.	GESZnO 7
PW-2: Artists supply: Use of ZnO-containing paints & coatings	Professional use of coatings and paints, thinners and paint removers containing ZnO.	GESZnO 8
PW-3: Use of ZnO-containing paper coatings	Professional use of paper coatings containing ZnO.	GESZnO 6
PW-4: Use of ZnO-containing textile & leather coatings	Professional use of leather & textile coatings containing ZnO	GESZnO 6
PW-5: Use of ZnO-containing glazes and glassy thin film coatings	Professional use of ZnO-containing formulations in the glazing and other thin film coating process.	GESZnO 6
PW-6: Use of ZnO-containing friction agents: Brake pads	Professional use of ZnO-containing friction agents in brake pads	GESZnO 6
PW-7: Use of ZnO-containing glassy thin film coatings	Professional use of ZnO-containing thin film coatings	GESZnO 6
PW-8: Use of ZnO-containing rubber and other resins for medical devices and applications	Professional use of ZnO-containing rubber and other resins for medical devices and applications	GESZnO 7
PW-9: Use of ZnO-containing polymers for floor, wall coverings and similar preparations	Professional use of ZnO-containing polymers for wall & floor coverings	GESZnO 7
PW-10: Use of ZnO-containing polymers for cable protecting & isolating coatings	Professional use of ZnO-containing polymers for sheet and cable protecting & isolating coatings	GESZnO 7
PW-11: Use of ZnO-containing polymers for tube & sheet articles	Professional use of ZnO-containing polymers for tube & sheet articles	GESZnO 7

Identified Use (IU) name	Brief description of use process	GES code
PW-12: Use of ZnO-containing polymers for molded articles	Professional use of ZnO-containing polymers for molded articles	GESZnO 7
PW-13: Use of ZnO-containing plastic thin films coatings	Professional use of ZnO-containing thin film coatings	GESZnO 8
PW-14: Use of ZnO-containing Sealants / Adhesives / Mastics	Professional use of ZnO-containing sealants and adhesives for various types of substrates	GESZnO 8
PW-15: Use of ZnO-containing Lubricants / Grease / Metal working fluids	Professional use of ZnO-containing lubricants and greases	GESZnO 8
PW-16: Use of ZnO-containing Polishes/ wax blends	Professional use of ZnO-containing polishes and wax blends	GESZnO 8
PW-17: Use of ZnO-containing de-icing products	Professional use of use of ZnO-containing de-icing products	GESZnO 8
PW-18: Use of ZnO-containing pyrotechnic products	Professional use of ZnO-containing pyrotechnic products.	GESZnO 8
PW-19: Use of cosmetics	Professional use of ZnO containing cosmetics preparations	GESZnO 8, Generic consumer exposure
PW-20: Use of Pharma / veterinary products	Professional use of ZnO in pharmaceutical preparations	GESZnO 8, Generic consumer exposure
PW-21: use of ZnO containing biocidal products	Professional use of biocidal products	GESZnO 8, Generic consumer exposure
PW-22: Use of ZnO containing cleaning products	Professional use of various cleaning products/detergents (car, dishwasher, floor, washing machine, ...) by automatic, semi-automatic or manual process (ref: AISE exposure scenarios)	GESZnO 8

Identified Use (IU) name	Brief description of use process	GES code
PW-23: Ancillary activity resulting in potential ZnO exposure: substrate preparation (sanding)	sanding of surfaces between application of coatings	GESZnO 6
PW-24: Professional formulation of fertiliser products		GESZnO - 6 & GESZnO - 7
PW-25: Professional USE as fertiliser in greenhouse		GESZnO - 7
PW-26: Professional use as liquid fertiliser in open field (fertigation)		GESZnO - 7
PW-27: Professional use as fertiliser - maintenance of equipment	Cleaning of equipment from residues of fertilisers containing the substance	GESZnO - 7
C-1: Artists supply: Use of ZnO-containing paints & coatings		GESZnO - 8 and consumer exposure
C-2: Use of ZnO-containing plastic thin films coatings		GESZnO - 8 and consumer exposure
C-3: Use of ZnO-containing Sealants / Adhesives / Mastics		GESZnO - 8 and consumer exposure
C-4: Use of ZnO-containing Lubricants / Grease / Metal working fluids		GESZnO - 8 and consumer exposure
C-5: Use of ZnO-containing Polishes / wax blends		GESZnO - 8 and consumer exposure
C-6: Use of ZnO-containing de-icing products		GESZnO - 8 and consumer exposure
C-7: Use of ZnO-containing pyrotechnic products		GESZnO - 8 and consumer exposure

Identified Use (IU) name	Brief description of use process	GES code
C-8: Use of ZnO-containing cleaning products		GESZnO - 8 and consumer exposure
C-9: Use of ZnO-containing fertilizer's formulations		GESZnO - 8 and consumer exposure
C-10: Use of cosmetics		GESZnO - 8 and consumer exposure
C-11: Use of Pharma / veterinary products		GESZnO - 8 and consumer exposure
C-12: Use of ZnO-containing antifouling paints		GESZnO - 8 and consumer exposure

*Corresponds to "GES 8" in IUCLID

16.8 Preparation Date (see heading)

16.9 Other

This Safety Data Sheet (SDS) provides information on the safety requirements working with this material. This SDS is not a guarantee of the product's properties. The information is believed to be accurate by the preparer utilizing reasonably available published data. We are not responsible for any inadvertent error or omission. End use of this product will include many factors beyond our control, and we cannot accept liability for any accident, injury, or damage caused by its use.