

ZIRCONIUM OXIDE (ZIRCONIA)

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SECTION 1: IDENTIFICATION

1.1 GHS Product identifier:

ZIRCONIUM OXIDE (ZIRCONIA)
Zirconium dioxide; ZrO2
CAS: 1314-23-4

Other means of identification:

Not relevant

1.2 Recommended use of the chemical and restrictions on use:

Relevant uses: Technical and advanced ceramics, refractories, abrasives and polishing compounds, catalyst support, oxygen sensors, opacifier in glazes/enamels, dental and biomedical ceramics. For industrial user only.
Uses advised against: All uses not specified in this section or in section 7.3.

1.3 Supplier's details:

SURAJ CHEMICALS
No 92, Govindappa Naicken Street, Shiva Complex, Chennai – 600001, Tamil Nadu, India
Tel: +91 - 7092722822, +91 - 9840284032 / +91 - 44 - 25393652, 42130281
Email: sales@surajchemicals.com | Website: www.surajchemicals.com
GST No: 33ACEPV8190L1ZZ

1.4 Emergency phone number:

Emergency Contact No: +91 - 7092722822, +91 - 9840284032

SECTION 2: HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture:

GHS:
Classification of this product has been carried out in accordance with the Globally Harmonized System of Classification and Labelling of Chemicals (GHS). Based on available data, the classification criteria for physical, health or environmental hazards are not met.

Not classified	No hazard class assigned under GHS criteria based on available data
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2.2 GHS label elements, including precautionary statements:

GHS: No signal word required

Hazard statements:

None required based on classification.

Precautionary statements:

P260: Do not breathe dust.
P280: Wear protective gloves/eye protection.
P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P501: Dispose of contents/container in accordance with local regulations.

2.3 Other hazards which do not result in classification:

Fine powder may cause mechanical irritation to eyes, skin and respiratory tract through nuisance-dust effects. Not a PBT or vPvB substance.

SECTION 3: COMPOSITION / INFORMATION ON INGREDIENTS

3.1 Substances:

Chemical description: Zirconium dioxide
In accordance with Annex 4.3.3 of the GHS, the product contains:

Identification	Chemical Name / Classification	Concentration
CAS: 1314-23-4	Zirconium oxide (zirconia) — Not classified	≥ 98%

To obtain more information on the hazards of the substances, consult sections 11, 12 and 16.

3.2 Mixtures:

Non-applicable

SECTION 4: FIRST AID MEASURES

4.1 Description of necessary first-aid measures:

In general, no specific first aid measures are required. If in doubt, request medical assistance, showing the SDS of this product.

By inhalation:

Remove the person affected from the area of exposure and provide fresh air. Seek medical attention if irritation or discomfort persists.

By skin contact:

Remove contaminated clothing. Wash the affected area thoroughly with plenty of water and soap.

By eye contact:

Rinse eyes thoroughly with lukewarm water for at least 15 minutes, lifting the upper and lower eyelids. Remove contact lenses if present and easy to do. Seek medical attention if irritation persists.

By ingestion/aspiration:

Rinse mouth with water. Do not induce vomiting. Seek medical attention if the person feels unwell.

4.2 Most important symptoms/effects, acute and delayed:

May cause mechanical irritation to eyes, skin and respiratory passages due to particulate nature. No other significant effects known.

4.3 Indication of immediate medical attention and special treatment needed, if necessary:

Not relevant; treat symptomatically.

SECTION 5: FIRE-FIGHTING MEASURES

5.1 Suitable extinguishing media:
Suitable: Water spray, foam, dry chemical powder, carbon dioxide – select per surrounding fire.
Unsuitable: None known.

5.2 Specific hazards arising from the chemical:
Non-combustible, non-flammable inorganic solid with a very high melting point. The product itself does not burn.

5.3 Special protective actions for fire-fighters:
No special measures required beyond those for the surrounding fire. Wear self-contained breathing apparatus in enclosed or confined spaces.

Additional provisions:
Avoid generating and inhaling dust during fire-fighting and clean-up.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures:

For non-emergency personnel:
Avoid generating dust. Use personal protective equipment as described in section 8. Ventilate the area.

For emergency responders:
Wear protective equipment described in section 8. No special measures beyond standard good industrial hygiene practice.

6.2 Environmental precautions:
Avoid release of large quantities to drains, soil or water courses. Not expected to pose a significant environmental hazard at normal spill quantities.

6.3 Methods and materials for containment and cleaning up:
Sweep or vacuum up (avoid dust dispersal) and place in a suitable, labelled container for reuse or disposal. Use wet methods or a HEPA-filtered vacuum where practicable.

6.4 Reference to other sections:
See sections 8 and 13.

SECTION 7: HANDLING AND STORAGE

7.1 Precautions for safe handling:

A. General precautions for safe use:
Avoid generating and breathing dust. Use with adequate ventilation. Handle in accordance with good industrial hygiene and safety practice.

B. Technical recommendations for the prevention of fires and explosions:
Not applicable – the product is non-combustible and does not present an explosion hazard.

C. Technical recommendations on general occupational hygiene:
Do not eat, drink or smoke while handling the product. Wash hands after handling.

D. Technical recommendations to prevent environmental risks:
Avoid uncontrolled discharge of dust/powder to the environment.

7.2 Conditions for safe storage, including any incompatibilities:

A. Specific storage requirements:

Storage temperature	Ambient
Storage condition	Dry, well-ventilated area, in closed containers
Shelf life	Indefinite under dry storage – refer to current specification sheet

B. General conditions for storage:
Store in original, tightly closed containers/bags, protected from moisture ingress and contamination.

7.3 Specific end use(s):
Except for the instructions already specified, it is not necessary to provide any special recommendation regarding the uses of this product.

SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Control parameters:

No substance-specific occupational exposure limit is established in India for zirconium oxide. Zirconium compounds (as Zr) and particulates not otherwise classified are commonly referenced as follows for general guidance:

Identification	Occupational Exposure Limit Type	Value
Zirconium compounds (as Zr)	Time Weighted average concentration (8 hrs)	5 mg/m³
Particulates not otherwise classified (PNOC)	Total dust, TWA (8 hrs)	10 mg/m³
	Respirable fraction, TWA (8 hrs)	3 mg/m³

8.2 Appropriate engineering controls:

Use local exhaust ventilation or dust extraction where powder is handled, weighed or packed, in order to maintain exposure below the limits in 8.1.

B. Respiratory protection:
Use a particulate (dust) filtering respirator where exposure limits may be exceeded or where dust is visibly generated.

C. Specific protection for the hands:
Protective gloves (e.g. nitrile or PVC) recommended for prolonged or repeated handling.

D. Eye and face protection:
Safety glasses or goggles recommended, particularly during bag opening, weighing or transfer.

E. Bodily protection:
Standard industrial workwear; dust-protective coveralls recommended for prolonged exposure.

F. Additional emergency measures:
Eyewash station recommended in the work area.

Environmental exposure controls:
Prevent large-scale release of dust/powder to the environment. See subsection 7.1.D.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties:

Appearance	
Physical state at 20°C	Solid (fine powder)
Appearance	Fine powder
Color	White
Odor	Odorless

Odour threshold	Not applicable
Volatility	
Boiling point at atmospheric pressure	≈ 4300°C
Vapour pressure at 20°C	Negligible
Evaporation rate at 20°C	Not applicable
Product Description	
Density / Relative density at 20°C	5.68 g/cm³
Bulk density	Typical value – refer to current specification sheet
pH (10% aqueous suspension)	6 – 8 (practically neutral)
Solubility in water at 20°C	Practically insoluble
Partition coefficient n-octanol/water	Not applicable (inorganic solid)
Decomposition temperature	Not applicable
Melting point/freezing point	2715°C
Flammability	
Flash Point	Not applicable (solid, non-flammable)
Flammability (solid, gas)	Non-flammable
Autoignition temperature	Not applicable
Lower / Upper flammability limit	Not applicable
Particle Characteristics	
Median particle size	Typical value – refer to current specification sheet

Values above are typical for the commercial grade; refer to current specification sheet for guaranteed values.

9.2 Other information:

Explosive properties	Not explosive
Oxidising properties	Not an oxidiser
Corrosive to metals	Not corrosive
Self-heating	Not self-heating
Water reactivity	Not reactive with water

SECTION 10: STABILITY AND REACTIVITY

10.1 Reactivity:

Chemically inert under normal conditions. Resistant to most acids and alkalis; attacked slowly by hydrofluoric acid and concentrated sulfuric acid.

10.2 Chemical stability:

Chemically stable under the indicated conditions of storage, handling and use.

10.3 Possibility of hazardous reactions:

Under the specified conditions, hazardous reactions are not expected.

10.4 Conditions to avoid:

Shock/Friction	Contact with Air	Increase in Temperature	Sunlight	Humidity
Not applicable	Not applicable	Not applicable	Not applicable	Not applicable

10.5 Incompatible materials:

Hydrofluoric Acid	Concentrated Sulfuric Acid
Avoid prolonged contact	Avoid prolonged contact

10.6 Hazardous decomposition products:

None under normal conditions.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects:

Based on available data, the classification criteria for acute toxicity, skin/eye irritation or corrosion, sensitisation, CMR effects, STOT or aspiration hazard are not met.

A. Ingestion (acute effect):

Low acute oral toxicity; essentially biologically inert and poorly absorbed.

B. Inhalation (acute effect):

Dust may cause mechanical irritation to the respiratory tract. Not known to cause pneumoconiosis at typical exposure levels.

C. Contact with skin and eyes (acute effect):

May cause mild mechanical irritation due to particulate nature; not expected to be a skin or eye irritant per GHS criteria.

D. CMR effects (carcinogenicity, mutagenicity, reproductive toxicity):

Classification criteria are not met based on available data. Not listed by IARC.

E. Sensitizing effects:

Not known to be a skin or respiratory sensitiser.

F. Specific target organ toxicity (STOT) – single exposure:

Classification criteria are not met based on available data.

G. Specific target organ toxicity (STOT) – repeated exposure:

Classification criteria are not met based on available data.

H. Aspiration hazard:

Not applicable (solid powder).

Product-specific toxicological information:

Identification	Acute Toxicity	Genus
Zirconium oxide CAS: 1314-23-4	LD50 oral: > 5000 mg/kg bw	Rat
	LD50 dermal: > 2000 mg/kg bw	Rabbit

SECTION 12: ECOLOGICAL INFORMATION

Not classified as hazardous to the aquatic environment based on available data; very low water solubility limits bioavailability.

12.1 Toxicity:

Identification	Acute Toxicity	Species	Genus
Zirconium oxide CAS: 1314-23-4	LC50: > 100 mg/L (96h)	Non-applicable	Fish
	EC50: > 100 mg/L (48h)	Non-applicable	Crustacean

12.2 Persistence and degradability:

Inorganic substance; the concept of biodegradability is not applicable. Highly stable in the environment.

12.3 Bioaccumulative potential:

Not expected to bioaccumulate owing to extremely low water solubility.

12.4 Mobility in soil:

Koc	Henry	Dry Soil	Moist Soil
Not relevant	Not relevant	Very low	Very low

12.5 Results of PBT and vPvB assessment:

Not applicable (inorganic substance).

12.6 Other adverse effects:

Not described

SECTION 13: DISPOSAL CONSIDERATIONS

13.1 Disposal methods:

Dispose of in accordance with local and national regulations, preferably through a licensed waste disposal contractor or as inert solid waste. Avoid release to drains or water courses as dust. Empty containers may be recycled or disposed of as per local regulations after thorough cleaning.
Refer to national and local regulations on waste management.

SECTION 14: TRANSPORT INFORMATION

Transport of dangerous goods by land (ADR / RID):

14.1 UN number	Not applicable – not classified as dangerous goods
14.2 UN proper shipping name	Non-applicable
14.3 Transport hazard class(es)	Non-applicable
14.4 Packing group	Non-applicable
14.5 Environmental hazard	No
14.6 Special precautions for user	None
14.7 Transport in bulk (Annex II MARPOL 73/78, IBC Code)	Not relevant

Transport of dangerous goods by sea (IMDG):

14.1 UN number	Not applicable – not classified as dangerous goods
14.2 UN proper shipping name	Non-applicable
14.3 Transport hazard class(es)	Non-applicable
14.4 Packing group	Non-applicable
14.5 Marine pollutant	No
14.6 Special precautions for user	None
14.7 Transport in bulk (Annex II MARPOL 73/78, IBC Code)	Not relevant

Transport of dangerous goods by air (IATA/ICAO):

14.1 UN number	Not applicable – not classified as dangerous goods
14.2 UN proper shipping name	Non-applicable
14.3 Transport hazard class(es)	Non-applicable
14.4 Packing group	Non-applicable
14.5 Environmental hazard	No
14.6 Special precautions for user	None
14.7 Transport in bulk (Annex II MARPOL 73/78, IBC Code)	Not relevant

SECTION 15: REGULATORY INFORMATION

15.1 Safety, health and environmental regulations specific for the product in question:

It is recommended to use the information included in this safety data sheet as data used in a risk evaluation of local circumstances, in order to establish the necessary risk prevention measures for the manipulation, use, storage and disposal of this product.

Other legislation:

Manufacture, Storage and Import of Hazardous Chemicals Rules 1989
The Factories Act, 1948 (Act No. 63 of 1948), as amended by the Factories (Amendment) Act, 1987 (Act 20 of 1987)

SECTION 16: OTHER INFORMATION

Legislation related to safety data sheets:

This safety data sheet has been designed in accordance with Annex 4 – Guidance on the preparation of Safety Data Sheets of the Globally Harmonized System of Classification and Labelling of Chemicals (GHS).

Texts of the legislative phrases mentioned in sections 2 and 3:

Not applicable – no hazard statements assigned.

Advice related to training:

Minimal training is recommended to prevent industrial risks for staff using this product, in order to facilitate their comprehension and interpretation of this safety data sheet, as well as the label on the product.

Principal bibliographical sources:

The United Nations Economic Commission for Europe (UNECE); publicly available GHS classification references for the listed CAS number.

Abbreviations and acronyms:

The information contained in this safety data sheet is based on sources, technical knowledge and current legislation, without being able to guarantee its accuracy. This information cannot be considered a guarantee of the properties of the product; it is simply a description of the security requirements. The occupational methodology and conditions for users of this product are not within Suraj Chemicals' awareness or control, and it is ultimately the responsibility of the user to take the necessary measures to obtain the legal requirements concerning the manipulation, storage, use and disposal of chemical products. The information on this safety data sheet only refers to this product, which should not be used for needs other than those specified.

END OF SAFETY DATA SHEET