



# ZIRCON SAND

## ALPHA CHEMICALS PTY LTD

Chemwatch Hazard Alert Code: 4

Chemwatch: 16578  
Version No: 6.1.15.10  
Safety Data Sheet according to WHS Regulations (Hazardous Chemicals) Amendment 2020 and ADG requirements

Issue Date: 20/08/2021  
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S.GHS.AUS.EN

### SECTION 1 Identification of the substance / mixture and of the company / undertaking

#### Product Identifier

Product name	ZIRCON SAND
Chemical Name	Not Available
Synonyms	zircon sand flour; zircon
Chemical formula	Not Available
Other means of identification	Not Available
CAS number	Not Available

#### Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses	In refractories, as foundry moulding sand; as an opacifier in glazes, ceramics and porcelain enamels; cements; casting mould coatings; As polishing materials; gem stones; source of zirconium oxide, zirconium and hafnium metals. Also used in foundry cores; linings for glass furnaces; in refractory porcelain i.e. laboratory crucibles; in frit glass filters. Catalyst in alkyl and alkenyl hydrocarbon manufacture; stabiliser in silicone rubbers. In Europe, a component of cosmetic creams and powders. Welding flux ingredient.
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#### Details of the supplier of the safety data sheet

Registered company name	ALPHA CHEMICALS PTY LTD
Address	4 ALLEN PLACE WETHERILL PARK NSW 2099 Australia
Telephone	61 (0)2 9982 4622
Fax	Not Available
Website	~
Email	shane@alphachem.com.au

#### Emergency telephone number

Association / Organisation	ALPHA CHEMICALS PTY LTD
Emergency telephone numbers	61 (0)418 237 771
Other emergency telephone numbers	Not Available

### SECTION 2 Hazards identification

#### Classification of the substance or mixture

**HAZARDOUS CHEMICAL. NON-DANGEROUS GOODS. According to the WHS Regulations and the ADG Code.**

#### ChemWatch Hazard Ratings

	Min	Max	
Flammability	0		
Toxicity	3		0 = Minimum
Body Contact	1		1 = Low
Reactivity	0		2 = Moderate
Chronic	4		3 = High
			4 = Extreme

Poisons Schedule	Not Applicable
Classification [1]	Acute Toxicity (Oral) Category 3, Acute Toxicity (Inhalation) Category 4, Serious Eye Damage/Eye Irritation Category 2B, Carcinogenicity Category 1A, Hazardous to the Aquatic Environment Long-Term Hazard Category 2
Legend:	1. Classified by Chemwatch; 2. Classification drawn from HCIS; 3. Classification drawn from Regulation (EU) No 1272/2008 - Annex VI

#### Label elements

Hazard pictogram(s)	
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Signal word	<b>Danger</b>
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**Hazard statement(s)**

H301	Toxic if swallowed.
H332	Harmful if inhaled.
H320	Causes eye irritation.
H350	May cause cancer.
H411	Toxic to aquatic life with long lasting effects.

**Precautionary statement(s) Prevention**

P201	Obtain special instructions before use.
P264	Wash all exposed external body areas thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves and protective clothing.
P261	Avoid breathing dust/fumes.
P273	Avoid release to the environment.

**Precautionary statement(s) Response**

P301+P310	IF SWALLOWED: Immediately call a POISON CENTER/doctor/physician/first aider.
P308+P313	IF exposed or concerned: Get medical advice/ attention.
P330	Rinse mouth.
P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P312	Call a POISON CENTER/doctor/physician/first aider/if you feel unwell.
P337+P313	If eye irritation persists: Get medical advice/attention.
P391	Collect spillage.
P304+P340	IF INHALED: Remove person to fresh air and keep comfortable for breathing.

**Precautionary statement(s) Storage**

P405	Store locked up.
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**Precautionary statement(s) Disposal**

P501	Dispose of contents/container to authorised hazardous or special waste collection point in accordance with any local regulation.
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**SECTION 3 Composition / information on ingredients**

**Substances**

CAS No	%[weight]	Name
14940-68-2	99	<u>Zircosil 5</u>
Not Available	<=1	oxides of hafnium, titanium, aluminium
Not Available		crystalline silica as
14808-60-7	<=0.2	<u>silica crystalline - quartz</u>
1317-80-2	0-0.2	<u>titanium dioxide (rutile)</u>
103170-28-1	0-0.2	<u>leucoxene</u>
1306-41-8	0.2	<u>monazite</u>
1302-76-7.	0.1-1.5	<u>kyanite</u>

**Legend:** 1. Classified by Chemwatch; 2. Classification drawn from HCIS; 3. Classification drawn from Regulation (EU) No 1272/2008 - Annex VI; 4. Classification drawn from C&L; \* EU IOELVs available

**Mixtures**

See section above for composition of Substances

**SECTION 4 First aid measures**

**Description of first aid measures**

Eye Contact	<p>If this product comes in contact with the eyes:</p> <ul style="list-style-type: none"> <li>▶ Immediately hold eyelids apart and flush the eye continuously with running water.</li> <li>▶ Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.</li> </ul>
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	<ul style="list-style-type: none"> <li>▶ Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes.</li> <li>▶ Transport to hospital or doctor without delay.</li> <li>▶ Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.</li> </ul>
<b>Skin Contact</b>	<p>If skin contact occurs:</p> <ul style="list-style-type: none"> <li>▶ Immediately remove all contaminated clothing, including footwear.</li> <li>▶ Flush skin and hair with running water (and soap if available).</li> <li>▶ Seek medical attention in event of irritation.</li> </ul>
<b>Inhalation</b>	<ul style="list-style-type: none"> <li>▶ If fumes or combustion products are inhaled remove from contaminated area.</li> <li>▶ Lay patient down. Keep warm and rested.</li> <li>▶ Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.</li> <li>▶ Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.</li> <li>▶ Transport to hospital, or doctor.</li> <li>▶ If dust is inhaled, remove from contaminated area.</li> <li>▶ Encourage patient to blow nose to ensure clear breathing passages.</li> <li>▶ Ask patient to rinse mouth with water but to not drink water.</li> <li>▶ Seek immediate medical attention.</li> </ul>
<b>Ingestion</b>	<ul style="list-style-type: none"> <li>▶ Give a slurry of activated charcoal in water to drink. <b>NEVER GIVE AN UNCONSCIOUS PATIENT WATER TO DRINK.</b></li> <li>▶ At least 3 tablespoons in a glass of water should be given.</li> <li>▶ Although induction of vomiting may be recommended (<b>IN CONSCIOUS PERSONS ONLY</b>), such a first aid measure is dissuaded due to the risk of aspiration of stomach contents. (i) It is better to take the patient to a doctor who can decide on the necessity and method of emptying the stomach. (ii) Special circumstances may however exist; these include non-availability of charcoal and the ready availability of the doctor.</li> </ul> <p><b>NOTE:</b> If vomiting is induced, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.</p> <p><b>NOTE:</b> Wear protective gloves when inducing vomiting.</p> <ul style="list-style-type: none"> <li>▶ REFER FOR MEDICAL ATTENTION WITHOUT DELAY.</li> <li>▶ In the mean time, qualified first-aid personnel should treat the patient following observation and employing supportive measures as indicated by the patient's condition.</li> <li>▶ If the services of a medical officer or medical doctor are readily available, the patient should be placed in his/her care and a copy of the SDS should be provided. Further action will be the responsibility of the medical specialist.</li> <li>▶ If medical attention is not available on the worksite or surroundings send the patient to a hospital together with a copy of the SDS. (ICSC20305/20307)</li> </ul>

#### Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

Although gamma radiation is present in all uranium mines, levels rarely exceed the acceptable standard of 5 rads per year. Adverse effects of uranium mining result from the inhalation of radon daughters. (The decay of radium produces radon, which in turn forms short life radon daughters i.e. isotopes of lead bismuth and polonium.) These products attach to dust particles which are inhaled by workers.

Alpha radiation delivers 95% of the radiation dose to the tracheobronchial epithelium. Lung cancer mortality and chronic lung disease [in uranium miners] strongly depends on radon exposure, cigarette smoking, and height. Although squamous and oat cell tumour types display a dose response effect, there is some difference in the strength of the association. [Ellenhorn & Barceloux]

## SECTION 5 Firefighting measures

#### Extinguishing media

- ▶ There is no restriction on the type of extinguisher which may be used.
- ▶ Use extinguishing media suitable for surrounding area.

#### Special hazards arising from the substrate or mixture

<b>Fire Incompatibility</b>	None known.
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#### Advice for firefighters

<b>Fire Fighting</b>	<ul style="list-style-type: none"> <li>▶ Alert Fire Brigade and tell them location and nature of hazard.</li> <li>▶ Wear breathing apparatus plus protective gloves in the event of a fire.</li> <li>▶ Prevent, by any means available, spillage from entering drains or water courses.</li> <li>▶ Use fire fighting procedures suitable for surrounding area.</li> <li>▶ <b>DO NOT</b> approach containers suspected to be hot.</li> <li>▶ Cool fire exposed containers with water spray from a protected location.</li> <li>▶ If safe to do so, remove containers from path of fire.</li> <li>▶ Equipment should be thoroughly decontaminated after use.</li> </ul>
<b>Fire/Explosion Hazard</b>	<p>If involved in a fire may decompose to zirconium oxide (ZrO<sub>2</sub>) and silicon dioxide (SiO<sub>2</sub>). Decomposition may produce toxic fumes of:</p> <p>silicon dioxide (SiO<sub>2</sub>) metal oxides</p> <p>May emit poisonous fumes. May emit corrosive fumes.</p> <ul style="list-style-type: none"> <li>▶ Non combustible.</li> <li>▶ Not considered a significant fire risk, however containers may burn.</li> </ul>
<b>HAZCHEM</b>	Not Applicable

## SECTION 6 Accidental release measures

#### Personal precautions, protective equipment and emergency procedures

See section 8

#### Environmental precautions

See section 12

#### Methods and material for containment and cleaning up

<b>Minor Spills</b>	<ul style="list-style-type: none"> <li>▶ Remove all ignition sources.</li> <li>▶ Clean up all spills immediately.</li> <li>▶ Avoid contact with skin and eyes.</li> <li>▶ Control personal contact with the substance, by using protective equipment.</li> <li>▶ Use dry clean up procedures and avoid generating dust.</li> <li>▶ Place in a suitable, labelled container for waste disposal.</li> </ul>
<b>Major Spills</b>	<p>Moderate hazard.</p> <ul style="list-style-type: none"> <li>▶ <b>CAUTION:</b> Advise personnel in area.</li> <li>▶ Alert Emergency Services and tell them location and nature of hazard.</li> <li>▶ Control personal contact by wearing protective clothing.</li> <li>▶ Prevent, by any means available, spillage from entering drains or water courses.</li> <li>▶ Recover product wherever possible.</li> <li>▶ <b>IF DRY:</b> Use dry clean up procedures and avoid generating dust. Collect residues and place in sealed plastic bags or other containers for disposal.</li> </ul>

Personal Protective Equipment advice is contained in Section 8 of the SDS.

## SECTION 7 Handling and storage

### Precautions for safe handling

<b>Safe handling</b>	<ul style="list-style-type: none"> <li>▶ Avoid all personal contact, including inhalation.</li> <li>▶ Wear protective clothing when risk of exposure occurs.</li> <li>▶ Use in a well-ventilated area.</li> <li>▶ Prevent concentration in hollows and sumps.</li> <li>▶ <b>DO NOT enter confined spaces until atmosphere has been checked.</b></li> <li>▶ <b>DO NOT allow material to contact humans, exposed food or food utensils.</b></li> <li>▶ Avoid contact with incompatible materials.</li> <li>▶ <b>When handling, DO NOT eat, drink or smoke.</b></li> </ul>
<b>Other information</b>	<ul style="list-style-type: none"> <li>▶ Store in original containers.</li> <li>▶ Keep containers securely sealed.</li> <li>▶ Store in a cool, dry area protected from environmental extremes.</li> <li>▶ Store away from incompatible materials and foodstuff containers.</li> <li>▶ Protect containers against physical damage and check regularly for leaks.</li> <li>▶ Observe manufacturer's storage and handling recommendations contained within this SDS.</li> </ul> <p>For major quantities:</p> <ul style="list-style-type: none"> <li>▶ Consider storage in banded areas - ensure storage areas are isolated from sources of community water (including stormwater, ground water, lakes and streams).</li> <li>▶ Ensure that accidental discharge to air or water is the subject of a contingency disaster management plan; this may require consultation with local authorities.</li> </ul>

### Conditions for safe storage, including any incompatibilities

<b>Suitable container</b>	<p>Multi-ply paper bag with sealed plastic liner or heavy gauge plastic bag.</p> <p><b>NOTE:</b> Bags should be stacked, blocked, interlocked, and limited in height so that they are stable and secure against sliding or collapse. Check that all containers are clearly labelled and free from leaks. Packing as recommended by manufacturer.</p>
<b>Storage incompatibility</b>	<p>Derivative of very electropositive metal. Actinide (actinoid)</p> <p>Only thorium and uranium occur in usable quantities in nature. The other actinides are man-made elements. All actinides are radioactive. They share similar chemistry with the lanthanides (lanthanoids) The size of actinides decreases with increasing atomic number.</p> <ul style="list-style-type: none"> <li>▶ <b>WARNING:</b> Avoid or control reaction with peroxides. All <i>transition metal</i> peroxides should be considered as potentially explosive. For example transition metal complexes of alkyl hydroperoxides may decompose explosively.</li> <li>▶ The pi-complexes formed between chromium(0), vanadium(0) and other transition metals (haloarene-metal complexes) and mono- or poly-fluorobenzene show extreme sensitivity to heat and are explosive.</li> <li>▶ Avoid reaction with borohydrides or cyanoborohydrides</li> <li>▶ Metals and their oxides or salts may react violently with chlorine trifluoride and bromine trifluoride.</li> <li>▶ These trifluorides are hypergolic oxidisers. They ignite on contact (without external source of heat or ignition) with recognised fuels - contact with these materials, following an ambient or slightly elevated temperature, is often violent and may produce ignition.</li> <li>▶ The state of subdivision may affect the results.</li> </ul>

## SECTION 8 Exposure controls / personal protection

### Control parameters

#### Occupational Exposure Limits (OEL)

#### INGREDIENT DATA

Source	Ingredient	Material name	TWA	STEL	Peak	Notes
Australia Exposure Standards	Zircosil 5	Zirconium compounds (as Zr)	5 mg/m3	10 mg/m3	Not Available	Not Available
Australia Exposure Standards	silica crystalline - quartz	Silica - Crystalline: Quartz (respirable dust)	0.05 mg/m3	Not Available	Not Available	Not Available
Australia Exposure Standards	titanium dioxide (rutile)	Titanium dioxide	10 mg/m3	Not Available	Not Available	(a) This value is for inhalable dust containing no asbestos and < 1% crystalline silica.

#### Emergency Limits

Ingredient	TEEL-1	TEEL-2	TEEL-3
Zircosil 5	21 mg/m3	170 mg/m3	1,000 mg/m3
silica crystalline - quartz	0.075 mg/m3	33 mg/m3	200 mg/m3

Ingredient	TEEL-1	TEEL-2	TEEL-3
titanium dioxide (rutile)	30 mg/m3	330 mg/m3	2,000 mg/m3
kyanite	3 mg/m3	33 mg/m3	200 mg/m3


Ingredient	Original IDLH	Revised IDLH
Zircosil 5	25 mg/m3	Not Available
silica crystalline - quartz	25 mg/m3 / 50 mg/m3	Not Available
titanium dioxide (rutile)	5,000 mg/m3	Not Available
leucosene	Not Available	Not Available
monazite	Not Available	Not Available
kyanite	Not Available	Not Available

#### Occupational Exposure Banding

Ingredient	Occupational Exposure Band Rating	Occupational Exposure Band Limit
monazite	E	≤ 0.01 mg/m <sup>3</sup>

**Notes:** Occupational exposure banding is a process of assigning chemicals into specific categories or bands based on a chemical's potency and the adverse health outcomes associated with exposure. The output of this process is an occupational exposure band (OEB), which corresponds to a range of exposure concentrations that are expected to protect worker health.

#### Exposure controls

<b>Appropriate engineering controls</b>	<p>Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection. The basic types of engineering controls are:</p> <p>Process controls which involve changing the way a job activity or process is done to reduce the risk.</p> <p>Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment. Ventilation can remove or dilute an air contaminant if designed properly. The design of a ventilation system must match the particular process and chemical or contaminant in use.</p> <p>Employers may need to use multiple types of controls to prevent employee overexposure.</p> <p>Local exhaust ventilation usually required.</p>
<b>Personal protection</b>	
<b>Eye and face protection</b>	<ul style="list-style-type: none"> <li>▶ Safety glasses with side shields.</li> <li>▶ Chemical goggles.</li> <li>▶ Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly.</li> </ul>
<b>Skin protection</b>	See Hand protection below
<b>Hands/feet protection</b>	<p>The selection of suitable gloves does not only depend on the material, but also on further marks of quality which vary from manufacturer to manufacturer. Where the chemical is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application.</p> <p>The exact break through time for substances has to be obtained from the manufacturer of the protective gloves and has to be observed when making a final choice.</p> <p>Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.</p> <p>Suitability and durability of glove type is dependent on usage.</p> <p>Experience indicates that the following polymers are suitable as glove materials for protection against undissolved, dry solids, where abrasive particles are not present.</p> <ul style="list-style-type: none"> <li>▶ polychloroprene.</li> <li>▶ nitrile rubber.</li> <li>▶ butyl rubber.</li> <li>▶ fluoroacoutchouc.</li> <li>▶ polyvinyl chloride.</li> </ul> <p>Gloves should be examined for wear and/ or degradation constantly.</p>
<b>Body protection</b>	See Other protection below
<b>Other protection</b>	<ul style="list-style-type: none"> <li>▶ Overalls.</li> <li>▶ P.V.C apron.</li> <li>▶ Barrier cream.</li> <li>▶ Skin cleansing cream.</li> <li>▶ Eye wash unit.</li> </ul>

#### Respiratory protection

Particulate. (AS/NZS 1716 & 1715, EN 143:2000 & 149:001, ANSI Z88 or national equivalent)

Required Minimum Protection Factor	Half-Face Respirator	Full-Face Respirator	Powered Air Respirator
up to 10 x ES	P1 Air-line*	- -	PAPR-P1 -
up to 50 x ES	Air-line**	P2	PAPR-P2
up to 100 x ES	-	P3	-

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100+ x ES	-	Air-line*	-
		Air-line**	PAPR-P3

\* - Negative pressure demand \*\* - Continuous flow

A(All classes) = Organic vapours, B AUS or B1 = Acid gasses, B2 = Acid gas or hydrogen cyanide(HCN), B3 = Acid gas or hydrogen cyanide(HCN), E = Sulfur dioxide(SO2), G = Agricultural chemicals, K = Ammonia(NH3), Hg = Mercury, NO = Oxides of nitrogen, MB = Methyl bromide, AX = Low boiling point organic compounds(below 65 degC)

- Respirators may be necessary when engineering and administrative controls do not adequately prevent exposures.
- The decision to use respiratory protection should be based on professional judgment that takes into account toxicity information, exposure measurement data, and frequency and likelihood of the worker's exposure - ensure users are not subject to high thermal loads which may result in heat stress or distress due to personal protective equipment (powered, positive flow, full face apparatus may be an option).
- Published occupational exposure limits, where they exist, will assist in determining the adequacy of the selected respiratory protection. These may be government mandated or vendor recommended.
- Certified respirators will be useful for protecting workers from inhalation of particulates when properly selected and fit tested as part of a complete respiratory protection program.
- Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU)
- Use approved positive flow mask if significant quantities of dust becomes airborne.
- Try to avoid creating dust conditions.

**SECTION 9 Physical and chemical properties**

**Information on basic physical and chemical properties**

<b>Appearance</b>	Colourless to slightly pink powder with no odour. Impurities in natural crystals give various colours including brown, grey and red. Insoluble in water, alkalis and acids. Available as Zircon sand - coarse grades. Zircon Flour - fine grades. Zircon sands contain trace amounts of radioactive uranium and thorium. Typically 50Bq/gram. Australian Zircon sands regularly are in lower radioactivity range.		
<b>Physical state</b>	Divided Solid	<b>Relative density (Water = 1)</b>	Approx. 4.6
<b>Odour</b>	Not Available	<b>Partition coefficient n-octanol / water</b>	Not Available
<b>Odour threshold</b>	Not Available	<b>Auto-ignition temperature (°C)</b>	Not Applicable
<b>pH (as supplied)</b>	Not Applicable	<b>Decomposition temperature</b>	1540
<b>Melting point / freezing point (°C)</b>	2550	<b>Viscosity (cSt)</b>	Not Applicable
<b>Initial boiling point and boiling range (°C)</b>	Not Applicable	<b>Molecular weight (g/mol)</b>	183.30
<b>Flash point (°C)</b>	Not Applicable	<b>Taste</b>	Not Available
<b>Evaporation rate</b>	Not Applicable	<b>Explosive properties</b>	Not Available
<b>Flammability</b>	Not Applicable	<b>Oxidising properties</b>	Not Available
<b>Upper Explosive Limit (%)</b>	Not Applicable	<b>Surface Tension (dyn/cm or mN/m)</b>	Not Applicable
<b>Lower Explosive Limit (%)</b>	Not Applicable	<b>Volatile Component (%vol)</b>	Not Applicable
<b>Vapour pressure (kPa)</b>	Nil.	<b>Gas group</b>	Not Available
<b>Solubility in water</b>	Immiscible	<b>pH as a solution (%)</b>	Not Applicable
<b>Vapour density (Air = 1)</b>	Not Applicable	<b>VOC g/L</b>	Not Applicable

**SECTION 10 Stability and reactivity**

<b>Reactivity</b>	See section 7
<b>Chemical stability</b>	<ul style="list-style-type: none"> <li>Unstable in the presence of incompatible materials.</li> <li>Product is considered stable.</li> <li>Hazardous polymerisation will not occur.</li> </ul>
<b>Possibility of hazardous reactions</b>	See section 7
<b>Conditions to avoid</b>	See section 7
<b>Incompatible materials</b>	See section 7
<b>Hazardous decomposition products</b>	See section 5

**SECTION 11 Toxicological information**

**Information on toxicological effects**

<b>Inhaled</b>	<p>Inhalation of dusts, generated by the material, during the course of normal handling, may be harmful.</p> <p>There is some evidence to suggest that the material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage.</p> <p>Dusts and mists containing uranium compounds are <b>highly toxic</b> and more so if inhaled rather than ingested. A single large dose can produce radiation sickness.</p> <p>alpha-Radiation kills cells immediately adjacent to the source of contact. Damage may be irreversible.</p> <p>Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.</p> <p>If prior damage to the circulatory or nervous systems has occurred or if kidney damage has been sustained, proper screenings should be conducted on individuals who may be exposed to further risk if handling and use of the material result in excessive exposures.</p>
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	<p>Effects on lungs are significantly enhanced in the presence of respirable particles. Zirconium workers exposed to fume for 1-5 years showed no abnormalities due to zirconium. Animal studies also reveal a low order of hazard from inhaled zirconium.</p> <p>A whole body dose of 2-10 Gray may cause loss of appetite, tiredness, nausea and vomiting, most severe after 6-12 hours. After this subsides a gross disturbance in blood cell distribution occurs with loss of white blood cells and platelets over weeks.</p>						
<b>Ingestion</b>	<p><b>Toxic effects</b> may result from the accidental ingestion of the material; animal experiments indicate that ingestion of less than 40 gram may be fatal or may produce serious damage to the health of the individual.</p> <p>The kidney and liver can be damaged by uranium, causing excessive acid and urea in the blood and generalised ill health. Because inorganic zirconium is poorly absorbed from the digestive tract, acute oral toxicity is low. Injection is much more dangerous, causing progressive depression until death.</p>						
<b>Skin Contact</b>	<p>Skin contact with the material may damage the health of the individual; systemic effects may result following absorption. There is some evidence to suggest that this material can cause inflammation of the skin on contact in some persons.</p> <p>All soluble uranium compounds are lethal when applied at sufficiently high concentrations in a single dose to the skin of rabbits; insoluble salts do not cause death and cause no signs of poisoning.</p> <p>Irritation and skin reactions are possible with sensitive skin The external application of zirconium can cause nodules in the skin of the armpits. Open cuts, abraded or irritated skin should not be exposed to this material</p> <p>Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.</p> <p>A whole body dose of 2-10 Gray may cause loss of appetite, tiredness, nausea and vomiting, most severe after 6-12 hours. After this subsides a gross disturbance in blood cell distribution occurs with loss of white blood cells and platelets over weeks.</p>						
<b>Eye</b>	<p>There is some evidence to suggest that this material can cause eye irritation and damage in some persons.</p> <p>Soluble uranium compounds are very dangerous. A single dose of 1 Gray may cause inflammation of the conjunctiva and cornea. alpha-Radiation produces severe inflammation of eyelid tissue and eye surface. There may be a delay of years before symptoms develop.</p>						
<b>Chronic</b>	<p>One report of a man with a granulomatous lung condition after 7 years regular exposure in a zirconium and hafnium processing plant and previous beryllium exposure [ILO]. Overexposure to zirconium silicate as fume in welding may cause irritation of the respiratory system and effect the lungs. Commercial zircon may contain up to 0.2% of crystalline silica, small amounts of which may be respirable. [Eutectic Corp. New York]</p> <p>Studies show that inhaling this substance for over a long period (e.g. in an occupational setting) may increase the risk of cancer.</p> <p>Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure. If absorbed in the body, uranium can be a hazard due to its radioactivity (alpha and gamma radiation). Uranium accumulates in the bones and can cause cancers there.</p> <p>Overexposure to the breathable dust may cause coughing, wheezing, difficulty in breathing and impaired lung function. Chronic symptoms may include decreased vital lung capacity and chest infections. Repeated exposures in the workplace to high levels of fine-divided dusts may produce a condition known as pneumoconiosis, which is the lodgement of any inhaled dusts in the lung, irrespective of the effect. This is particularly true when a significant number of particles less than 0.5 microns (1/50000 inch) are present. Lung shadows are seen in the X-ray. Symptoms of pneumoconiosis may include a progressive dry cough, shortness of breath on exertion, increased chest expansion, weakness and weight loss. As the disease progresses, the cough produces stringy phlegm, vital capacity decreases further, and shortness of breath becomes more severe. Other signs or symptoms include changed breath sounds, reduced oxygen uptake during exercise, emphysema and rarely, pneumothorax (air in the lung cavity).</p> <p>Zirconium can accumulate in the spleen. Oral administration has not been shown to cause any ill effects.</p>						
<b>ZIRCON SAND</b>	<table border="1"> <thead> <tr> <th>TOXICITY</th> <th>IRRITATION</th> </tr> </thead> <tbody> <tr> <td>Not Available</td> <td>Not Available</td> </tr> </tbody> </table>	TOXICITY	IRRITATION	Not Available	Not Available		
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Not Available	Not Available						
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TOXICITY	IRRITATION						
Not Available	Not Available						
<b>Legend:</b>	<p>1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2. * Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances</p>						

<b>ZIRCOSIL 5</b>	<p>OSHA concluded that the recommended TLV-TWA and STEL would protect workers from any significant risk of pulmonary effects. NIOSH conclude that a separate limit should be considered for zirconium tetrachloride (because of the irritancy of hydrogen chloride derived from hydrolysis). This was based on a 60-day inhalation study at 6 mg/m<sup>3</sup> zirconium tetrachloride which found an increase in mortality of rats and guinea pigs due to respiratory infection and reductions of borderline statistical significance in circulating hemoglobin and erythrocyte counts in dogs.</p> <p>The concentration of dust, for application of respirable dust limits, is to be determined from the fraction that penetrates a separator whose size collection efficiency is described by a cumulative log-normal function with a median aerodynamic diameter of 4.0 um (+-) 0.3 um and with a geometric standard deviation of 1.5 um (+-) 0.1 um, i.e., generally less than 5 um.</p> <p>Zircon sands may contain trace amounts (106-120 picoCurie per gram or 3.9-4.44 Bq/g) of naturally occurring radioactive uranium and thorium. However, measurements made by US DuPont during the use of similar mineral sands indicated that by observing OSHA Permitted Exposure Limit (PEL) for respirable quartz dust, i.e. 0.05 mg/m<sup>3</sup> ensured the user is below the permitted limits [radioactive dose annual intake] established</p>
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ZIRCON SAND

	for uranium and thorium. [North American Refractories Co.]
<b>SILICA CRYSTALLINE - QUARTZ</b>	<p><b>WARNING:</b> For inhalation exposure <u>ONLY</u>: This substance has been classified by the IARC as Group 1: <b>CARCINOGENIC TO HUMANS</b></p> <p>The International Agency for Research on Cancer (IARC) has classified occupational exposures to <b>respirable</b> (&lt;5 µm) crystalline silica as being carcinogenic to humans. This classification is based on what IARC considered sufficient evidence from epidemiological studies of humans for the carcinogenicity of inhaled silica in the forms of quartz and cristobalite. Crystalline silica is also known to cause silicosis, a non-cancerous lung disease.</p> <p>Intermittent exposure produces; focal fibrosis, (pneumoconiosis), cough, dyspnoea, liver tumours.</p> <p>* Millions of particles per cubic foot (based on impinger samples counted by light field techniques).</p> <p>NOTE : the physical nature of quartz in the product determines whether it is likely to present a chronic health problem. To be a hazard the material must enter the breathing zone as respirable particles.</p>
<b>TITANIUM DIOXIDE (RUTILE)</b>	<p>The material may produce moderate eye irritation leading to inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.</p> <p>The material may cause skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin.</p> <p>Exposure to titanium dioxide is via inhalation, swallowing or skin contact. When inhaled, it may deposit in lung tissue and lymph nodes causing dysfunction of the lungs and immune system. Absorption by the stomach and intestines depends on the size of the particle. It penetrated only the outermost layer of the skin, suggesting that healthy skin may be an effective barrier. There is no substantive data on genetic damage, though cases have been reported in experimental animals. Studies have differing conclusions on its cancer-causing potential.</p> <p>Skin (human) 0.3: mg/3d-I mild</p>
<b>MONAZITE</b>	<p>Asthma-like symptoms may continue for months or even years after exposure to the material ends. This may be due to a non-allergic condition known as reactive airways dysfunction syndrome (RADS) which can occur after exposure to high levels of highly irritating compound. Main criteria for diagnosing RADS include the absence of previous airways disease in a non-atopic individual, with sudden onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. Other criteria for diagnosis of RADS include a reversible airflow pattern on lung function tests, moderate to severe bronchial hyperreactivity on methacholine challenge testing, and the lack of minimal lymphocytic inflammation, without eosinophilia. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. On the other hand, industrial bronchitis is a disorder that occurs as a result of exposure due to high concentrations of irritating substance (often particles) and is completely reversible after exposure ceases. The disorder is characterized by difficulty breathing, cough and mucus production.</p> <p>Lanthanide poisoning causes immediate defaecation, writhing, inco-ordination, laboured breathing, and inactivity. Respiratory and heart failure may follow causing death.</p> <p>For typical lanthanides: Symptoms of toxicity from rare earth elements include writhing, inco-ordination, laboured breathing, and sedation. They show low toxicity via swallowing. However, if given through the peritoneal cavity, they may be severely toxic, and injected through the skin, they are moderately toxic. They cause granulomas after exposure.</p> <p>Chronic inhalation toxicity: Chronically exposed humans have been shown to have lanthanide particles accumulate in the airway, with enlargement of lymph nodes of the bronchi being observed.</p> <p>Developmental/reproductive toxicity: One animal study did not show lanthanum carbonate to affect fertility or harm the foetus.</p> <p>Mutation-causing potential: Animal studies showed cerium oxide to be negative with respect to mutation-causing potential.</p> <p>Cancer-causing potential: An long-term animal (rat) study showed that lanthanum carbonate is not carcinogenic.</p> <p>Thorium and its compounds are mainly alpha particle emitters although beta and gamma radiation is also encountered</p> <p>The radiological danger is considerably more serious than the chemical danger in view of the long time that all thorium compounds remain in the organs where they are deposited (mainly in bones, lungs, lymphatic glands etc.) leading to long-term alpha-irradiation of the tissues.</p>
<b>ZIRCON SAND &amp; TITANIUM DIOXIDE (RUTILE) &amp; LEUCOXENE &amp; MONAZITE &amp; KYANITE</b>	No significant acute toxicological data identified in literature search.

<b>Acute Toxicity</b>	✓	<b>Carcinogenicity</b>	✓
<b>Skin Irritation/Corrosion</b>	✗	<b>Reproductivity</b>	✗
<b>Serious Eye Damage/Irritation</b>	✓	<b>STOT - Single Exposure</b>	✗
<b>Respiratory or Skin sensitisation</b>	✗	<b>STOT - Repeated Exposure</b>	✗
<b>Mutagenicity</b>	✗	<b>Aspiration Hazard</b>	✗

**Legend:** ✗ – Data either not available or does not fill the criteria for classification  
✓ – Data available to make classification

**SECTION 12 Ecological information**

**Toxicity**

	Endpoint	Test Duration (hr)	Species	Value	Source
<b>ZIRCON SAND</b>	Not Available	Not Available	Not Available	Not Available	Not Available
<b>Zircosil 5</b>	Not Available	Not Available	Not Available	Not Available	Not Available
<b>silica crystalline - quartz</b>	Not Available	Not Available	Not Available	Not Available	Not Available
<b>titanium dioxide (rutile)</b>	EC50	72h	Algae or other aquatic plants	13mg/l	2



ZIRCON SAND

	EC50	48h	Crustacea	>100mg/l	2
	LC50	96h	Fish	>100mg/l	2
	NOEC(ECx)	48h	Crustacea	<=1mg/l	2
<b>leucoxene</b>	<b>Endpoint</b>	<b>Test Duration (hr)</b>	<b>Species</b>	<b>Value</b>	<b>Source</b>
	Not Available	Not Available	Not Available	Not Available	Not Available
<b>monazite</b>	<b>Endpoint</b>	<b>Test Duration (hr)</b>	<b>Species</b>	<b>Value</b>	<b>Source</b>
	Not Available	Not Available	Not Available	Not Available	Not Available
<b>kyanite</b>	<b>Endpoint</b>	<b>Test Duration (hr)</b>	<b>Species</b>	<b>Value</b>	<b>Source</b>
	Not Available	Not Available	Not Available	Not Available	Not Available
<b>Legend:</b>	Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. EPIWIN Suite V3.12 (QSAR) - Aquatic Toxicity Data (Estimated) 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data				

Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Do NOT allow product to come in contact with surface waters or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash-waters.

Wastes resulting from use of the product must be disposed of on site or at approved waste sites.

Although the components of an ecosystem can be divided into several major compartments, they function as a unit by means of connections or interchanges between them. Initial uranium deposition in a compartment, as well as exchanges between compartments (mobility), are dependent upon numerous factors such as chemical and physical form of the uranium, environmental media, organic material present, oxidation-reduction potential, nature of sorbing materials, and size and composition of sorbing particles. Environmental concerns related to uranium generally arise following deliberate release (in munitions) and notably address concerns related to ionising radiation. Less well recognised is exposure to depleted forms of uranium resulting from radioactive decay. Depleted uranium (DU) occurs in fragments and dust of uranium metal and oxides, the extent of which depends on the magnitude of the impact, heat generated and explosive force of the original munition. Heavier fragments and dust settle close to the site of impact while finer dust is carried further afield. Consequently, contamination levels decrease rapidly with distance. DU can also be released into the air from production and processing facilities.

For Metal:

Atmospheric Fate - Metal-containing inorganic substances generally have negligible vapour pressure and are not expected to partition to air.

Environmental Fate: Environmental processes, such as oxidation, the presence of acids or bases and microbiological processes, may transform insoluble metals to more soluble ionic forms. Environmental processes may enhance bioavailability and may also be important in changing solubilities.

Aquatic/Terrestrial Fate: When released to dry soil, most metals will exhibit limited mobility and remain in the upper layer; some will leach locally into ground water and/ or surface water ecosystems when soaked by rain or melt ice. A metal ion is considered infinitely persistent because it cannot degrade further. Once released to surface waters and moist soils their fate depends on solubility and dissociation in water. A significant proportion of dissolved/ sorbed metals will end up in sediments through the settling of suspended particles. The remaining metal ions can then be taken up by aquatic organisms. Ionic species may bind to dissolved ligands or sorb to solid particles in water.

Soluble salts of zirconium are moderately toxic to algae and fish. Zirconium is more toxic in soft water than in hard water. The toxicity of zirconium salts and zirconium complexes with organic acids are expected to be related to their water solubilities and their octanol/ water partition coefficient (Kow). Compounds with molecular weights exceeding 1000 are not expected to be absorbed by aquatic organisms even if they are water soluble. Only water-soluble zirconium compounds with a molecular weight of less than 1000 are expected to be toxic.

**DO NOT discharge into sewer or waterways.**

#### Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
titanium dioxide (rutile)	HIGH	HIGH

#### Bioaccumulative potential

Ingredient	Bioaccumulation
titanium dioxide (rutile)	LOW (BCF = 10)

#### Mobility in soil

Ingredient	Mobility
titanium dioxide (rutile)	LOW (KOC = 23.74)

### SECTION 13 Disposal considerations


#### Waste treatment methods

<b>Product / Packaging disposal</b>	<ul style="list-style-type: none"> <li>▶ Containers may still present a chemical hazard/ danger when empty.</li> <li>▶ Return to supplier for reuse/ recycling if possible.</li> </ul> <p>Otherwise:</p> <ul style="list-style-type: none"> <li>▶ If container can not be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorised landfill.</li> <li>▶ Where possible retain label warnings and SDS and observe all notices pertaining to the product.</li> </ul> <p>Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.</p> <p>A Hierarchy of Controls seems to be common - the user should investigate:</p> <ul style="list-style-type: none"> <li>▶ Reduction</li> <li>▶ Reuse</li> <li>▶ Recycling</li> <li>▶ Disposal (if all else fails)</li> </ul> <p>This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate. In most instances the supplier of the material should be consulted.</p>
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- ▶ **DO NOT allow wash water from cleaning or process equipment to enter drains.**
- ▶ It may be necessary to collect all wash water for treatment before disposal.
- ▶ In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.
- ▶ Where in doubt contact the responsible authority.
- ▶ Recycle wherever possible or consult manufacturer for recycling options.
- ▶ Consult State Land Waste Management Authority for disposal.
- ▶ Bury residue in an authorised landfill.
- ▶ Recycle containers if possible, or dispose of in an authorised landfill.

## SECTION 14 Transport information

### Labels Required

<b>Marine Pollutant</b>	
<b>HAZCHEM</b>	Not Applicable

**Land transport (ADG): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS**

**Air transport (ICAO-IATA / DGR): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS**

**Sea transport (IMDG-Code / GGVSee): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS**

**Transport in bulk according to Annex II of MARPOL and the IBC code**

Not Applicable

**Transport in bulk in accordance with MARPOL Annex V and the IMSBC Code**

Product name	Group
Zircosil 5	Not Available
silica crystalline - quartz	Not Available
titanium dioxide (rutile)	Not Available
leucoxene	Not Available
monazite	Not Available
kyanite	Not Available

**Transport in bulk in accordance with the ICG Code**

Product name	Ship Type
Zircosil 5	Not Available
silica crystalline - quartz	Not Available
titanium dioxide (rutile)	Not Available
leucoxene	Not Available
monazite	Not Available
kyanite	Not Available

## SECTION 15 Regulatory information

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

#### Zircosil 5 is found on the following regulatory lists

Australian Inventory of Industrial Chemicals (AIIC)

#### silica crystalline - quartz is found on the following regulatory lists

Australia Hazardous Chemical Information System (HCIS) - Hazardous Chemicals  
Australia Model Work Health and Safety Regulations - Hazardous chemicals (other than lead) requiring health monitoring  
Australian Inventory of Industrial Chemicals (AIIC)

Chemical Footprint Project - Chemicals of High Concern List  
International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs

International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs - Group 1: Carcinogenic to humans

#### titanium dioxide (rutile) is found on the following regulatory lists

Australian Inventory of Industrial Chemicals (AIIC)  
Chemical Footprint Project - Chemicals of High Concern List  
International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs

International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs - Group 2B: Possibly carcinogenic to humans

International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)

#### leucoxene is found on the following regulatory lists

Australian Inventory of Industrial Chemicals (AIIC)

#### monazite is found on the following regulatory lists

Not Applicable

#### kyanite is found on the following regulatory lists

Australian Inventory of Industrial Chemicals (AIIC)

**National Inventory Status**

National Inventory	Status
Australia - AIIIC / Australia Non-Industrial Use	No (monazite)
Canada - DSL	No (leucoxene; monazite)
Canada - NDSL	No (Zircosil 5; silica crystalline - quartz; titanium dioxide (rutile); leucoxene; monazite; kyanite)
China - IECSC	No (leucoxene; monazite)
Europe - EINEC / ELINCS / NLP	No (leucoxene; monazite)
Japan - ENCS	No (leucoxene; monazite; kyanite)
Korea - KECI	No (leucoxene; monazite)
New Zealand - NZIoC	No (monazite)
Philippines - PICCS	No (leucoxene; monazite; kyanite)
USA - TSCA	No (leucoxene; monazite; kyanite)
Taiwan - TCSI	No (monazite)
Mexico - INSQ	No (leucoxene; monazite; kyanite)
Vietnam - NCI	No (leucoxene; monazite)
Russia - FBEPH	No (leucoxene; monazite)
<b>Legend:</b>	<i>Yes = All CAS declared ingredients are on the inventory No = One or more of the CAS listed ingredients are not on the inventory. These ingredients may be exempt or will require registration.</i>

**SECTION 16 Other information**

<b>Revision Date</b>	20/08/2021
<b>Initial Date</b>	01/11/2009

**SDS Version Summary**

Version	Date of Update	Sections Updated
5.1.1.1	20/12/2016	Acute Health (eye), Acute Health (inhaled), Acute Health (skin), Acute Health (swallowed), Advice to Doctor, Chronic Health, Classification, Disposal, Environmental, Exposure Standard, First Aid (eye), First Aid (swallowed), Ingredients, Personal Protection (Respirator), Physical Properties, Storage (storage incompatibility), Storage (storage requirement), Storage (suitable container), Synonyms
5.1.2.1	26/04/2021	Regulation Change
5.1.3.1	03/05/2021	Regulation Change
5.1.4.1	06/05/2021	Regulation Change
5.1.5.1	10/05/2021	Regulation Change
5.1.5.2	30/05/2021	Template Change
5.1.5.3	04/06/2021	Template Change
5.1.5.4	05/06/2021	Template Change
5.1.6.4	07/06/2021	Regulation Change
5.1.6.5	09/06/2021	Template Change
5.1.6.6	11/06/2021	Template Change
5.1.6.7	15/06/2021	Template Change
5.1.7.7	17/06/2021	Regulation Change
5.1.8.7	21/06/2021	Regulation Change
5.1.8.8	05/07/2021	Template Change
5.1.9.8	14/07/2021	Regulation Change
5.1.10.8	19/07/2021	Regulation Change
5.1.10.9	01/08/2021	Template Change
5.1.11.9	02/08/2021	Regulation Change
5.1.12.9	05/08/2021	Regulation Change
5.1.13.9	09/08/2021	Regulation Change
6.1.13.9	20/08/2021	Expiration. Review and Update
6.1.14.9	23/08/2021	Regulation Change
6.1.15.9	26/08/2021	Regulation Change
6.1.15.10	29/08/2021	Template Change

**Other information**

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

The SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

## Definitions and abbreviations

PC—TWA: Permissible Concentration-Time Weighted Average  
PC—STEL: Permissible Concentration-Short Term Exposure Limit  
IARC: International Agency for Research on Cancer  
ACGIH: American Conference of Governmental Industrial Hygienists  
STEL: Short Term Exposure Limit  
TEEL: Temporary Emergency Exposure Limit.  
IDLH: Immediately Dangerous to Life or Health Concentrations  
ES: Exposure Standard  
OSF: Odour Safety Factor  
NOAEL :No Observed Adverse Effect Level  
LOAEL: Lowest Observed Adverse Effect Level  
TLV: Threshold Limit Value  
LOD: Limit Of Detection  
OTV: Odour Threshold Value  
BCF: BioConcentration Factors  
BEI: Biological Exposure Index  
AIIIC: Australian Inventory of Industrial Chemicals  
DSL: Domestic Substances List  
NDSL: Non-Domestic Substances List  
IECSC: Inventory of Existing Chemical Substance in China  
EINECS: European INventory of Existing Commercial chemical Substances  
ELINCS: European List of Notified Chemical Substances  
NLP: No-Longer Polymers  
ENCS: Existing and New Chemical Substances Inventory  
KECI: Korea Existing Chemicals Inventory  
NZIoC: New Zealand Inventory of Chemicals  
PICCS: Philippine Inventory of Chemicals and Chemical Substances  
TSCA: Toxic Substances Control Act  
TCSI: Taiwan Chemical Substance Inventory  
INSQ: Inventario Nacional de Sustancias Químicas  
NCI: National Chemical Inventory  
FBEPH: Russian Register of Potentially Hazardous Chemical and Biological Substances

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