



IOWA DEPARTMENT OF NATURAL RESOURCES  
**REQUEST FOR SPECIAL WASTE  
 AUTHORIZATION**



Check one of the following:  New Application  Renewal, Existing SWA #: \_\_\_\_\_

The intent of a special waste authorization is to provide safe and proper management for disposal of wastes which present a threat to human health or the environment or a waste with inherent properties which make the disposal of the waste in a sanitary landfill difficult to manage. It is each landfill’s responsibility to inform the waste generator if a waste should be handled as a special waste and to ensure that special wastes delivered to the landfill conform to the Special Waste Acceptance Criteria (SWAC) on file with the Department. It is the Department’s responsibility to review each application for a special waste authorization to verify that the proposed waste can be landfilled under the current regulations in Iowa.

**READ THE FOLLOWING INSTRUCTIONS BEFORE COMPLETING THIS APPLICATION**

**Waste Generator:**

1. Complete Sections 1-3 of this application applicable to the waste characterization and disposal information.
2. Attach Toxicity Characteristic Leaching Procedure (TCLP) test results, material safety data sheet(s) (MSDS), or evidence of “processor knowledge” when appropriate that demonstrates the waste is not considered a characteristic hazardous waste exhibiting the properties of flammability, corrosivity, reactivity or toxicity or a listed hazardous waste as defined in 40 CFR Part 261, Subpart D.
3. Provide signature in Section 3 to verify that the information provided is true, accurate and complete.
4. Mail or deliver the completed application with attachments to the requested disposal destination (*must be a landfill that is authorized to accept waste from the service area of where the waste was generated*). Please contact Mike Smith at (515) 229-8356 for a list of landfills authorized to accept waste from the service area in which your facility is located.

**Receiving Landfill:** Prior review of this application by the receiving landfill allows the department to more quickly process and evaluate the application.

1. Complete Section 5 of this application applicable to the landfill.
2. Indicate by signing the application that the landfill is willing to accept the waste if a Special Waste Authorization is issued by the department and if instructions for disposal of the waste, as contained in the landfill’s SWAC, are followed by the generator.
3. Attach SWAC procedures for disposal of the waste.
4. Keep 1 copy for your records and submit the remaining one copy of the completed application with attachments (TCLP, MSDS, SWAC, etc.) to the department at the following address, or email to [mike.smith@dnr.iowa.gov](mailto:mike.smith@dnr.iowa.gov):

Iowa Department of Natural Resources  
 Land Quality Bureau- Attn: Mike Smith  
 6200 Park Ave Ste 200  
 Des Moines, IA 50321

Applications will be considered incomplete if not signed by both the waste generator and receiving landfill. The receiving landfill must attach a copy of the SWAC for the particular waste for which the application has been submitted.

Written notification of approval or rejection will be mailed or emailed to the generator and landfill. If approved, a copy of the authorization must accompany the waste hauler to the landfill.

For questions concerning this application contact Mike Smith at (515) 229-8356 or [mike.smith@dnr.iowa.gov](mailto:mike.smith@dnr.iowa.gov).

**SECTION 1: WASTE GENERATOR INFORMATION**

Name of Primary Contact\* \_\_\_\_\_ Title \_\_\_\_\_

*\*SWA approvals will be sent to this person at the address provided below.*

Company Name \_\_\_\_\_

Mailing Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip Code \_\_\_\_\_

Telephone # \_\_\_\_\_ Email Address \_\_\_\_\_

**Address or location of the point of generation of the waste, if different from the company address:**

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip Code \_\_\_\_\_

**SECTION 2: WASTE CHARACTERIZATION**

Waste determined to be hazardous may not be landfilled in Iowa. Attach TCLP analysis that demonstrates the waste is not considered hazardous. For raw or virgin materials being disposed of, a MSDS that indicates the waste is not hazardous may be submitted in lieu of a TCLP analysis.

The generator may also apply knowledge of the hazardous characteristic(s) of the waste in light of the materials or the processes used ("knowledge of process"). In order to use knowledge to characterize the waste, the knowledge that is applied must be valid and verifiable and the generator must be able to demonstrate the basis for their claim by providing supporting information to justify that conclusion.

**Name and description of waste. Please address any RCRA listings derived from wastes etc., that may be applicable and why these listings would not pertain to the waste:**

**Has any pretreatment been utilized? If so, please describe the pretreatment process:**

**List the alternatives to disposal that were analyzed and reason not utilized (*attach extra sheets if necessary*):**



**SECTION 5: LANDFILL INFORMATION**

The following section is to be completed by the receiving landfill. By signing below, the landfill verifies that the application has been examined and if approved by the department, is willing to accept the waste described within, provided that instructions for disposal of the waste, as contained in the landfill's Special Waste Acceptance Criteria, are followed by the generator.

Prior review of this application by the receiving landfill will allow the department to more quickly process and evaluate the application. Please address the following:

**Indicate the properties that lead you to believe this is a special waste:**

**Indicate any special handling procedures that the waste generator must follow prior to delivery at the landfill:**

**Name of Responsible Official\*:** \_\_\_\_\_

*\*SWA approvals will be sent to this person at the address given below.*

**Solid Waste Agency Name** \_\_\_\_\_

**Mailing Address** \_\_\_\_\_

**City** \_\_\_\_\_ **State** \_\_\_\_\_ **Zip Code** \_\_\_\_\_

**Telephone #** \_\_\_\_\_ **Email Address** \_\_\_\_\_

**Responsible Official Signature:** \_\_\_\_\_ **Date:** \_\_\_\_\_

# SAFETY DATA SHEET



## 1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

### 1.1 Product identifier

Product name           **STANDARD GRADE RUTILE SAND**

Synonym(s)             RUTILE

### 1.2 Uses and uses advised against

Use(s)                   Predominantly used as a raw material for welding rod fluxes.

### 1.3 Details of the supplier of the product

Supplier name           **SIERRA RUTILE LIMITED**  
Address                 110 Wilkinson Road, PO Box 59, Freetown, SIERRA LEONE  
Telephone               +232 30948000  
Email                    [srlfree@sierra-rutile.com](mailto:srlfree@sierra-rutile.com)  
Website                 <http://www.sierra-rutile.com>

### 1.4 Emergency telephone number(s)

Emergency              +232 30994444

## 2. HAZARDS IDENTIFICATION

### 2.1 Classification of the substance or mixture

NOT CLASSIFIED AS HAZARDOUS ACCORDING TO GLOBALLY HARMONISED SYSTEM OF CLASSIFICATION AND LABELLING OF CHEMICALS (GHS)

### 2.2 Label elements

No signal word, pictograms, hazard or precautionary statements have been allocated.

### 2.3 Other hazards

No information provided.

## 3. COMPOSITION/ INFORMATION ON INGREDIENTS

### 3.1 Substances / Mixtures

Ingredient	CAS Number	EC Number	Content
RUTILE (TiO <sub>2</sub> )	1317-80-2	215-282-2	>97%
ZIRCON	14940-68-2	239-019-6	<1.5%
LEUCOXENE	12173-81-8		<1%
ILMENITE	103170-28-1		<1%
KYANITE	1302-76-7	215-106-4	<0.2%
PYRITE	1309-36-0	215-167-7	<0.3%

Ingredient Notes                   Respirable Crystalline Silica <0.01%

## 4. FIRST AID MEASURES

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### 4.1 Description of first aid measures

<b>Eye</b>	If in eyes, hold eyelids apart and flush continuously with running water for several minutes, or until particle is removed. Remove contact lenses if present and continue rinsing.
<b>Inhalation</b>	If inhaled, move to fresh air and keep comfortable.
<b>Skin</b>	If skin or hair contact occurs, brush off loose particles. If on clothing, brush off loose particles. If irritation occurs, seek medical advice.
<b>Ingestion</b>	If swallowed, rinse mouth and get medical attention if you feel unwell.
<b>First aid facilities</b>	Eye wash facilities should be available.

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

See Section 11 for more detailed information on health effects and symptoms.

### 4.3 Immediate medical attention and special treatment needed

Treat symptomatically.

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## 5. FIRE FIGHTING MEASURES

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### 5.1 Extinguishing media

Use an extinguishing agent suitable for the surrounding fire.

### 5.2 Special hazards arising from the substance or mixture

Non-flammable. May evolve toxic gases if strongly heated.

### 5.3 Advice for firefighters

No fire or explosion hazard exists.

### 5.4 Hazchem code

None allocated.

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## 6. ACCIDENTAL RELEASE MEASURES

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

Wear Personal Protective Equipment (PPE) as detailed in Section 8. Clear all unprotected personnel from area. Contact emergency services where appropriate.

### 6.2 Environmental precautions

Prevent product from entering drains and waterways.

### 6.3 Methods of cleaning up

Contain spillage, then collect and place in suitable containers for reuse or disposal. Avoid generating dust.

### 6.4 Reference to other sections

See Sections 8 and 13 for exposure controls and disposal.

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## 7. HANDLING AND STORAGE

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### 7.1 Precautions for safe handling

Carefully read the product label before use. Safe work practices are recommended to avoid eye or skin contact and inhalation. Observe good personal hygiene, including washing hands before eating. Prohibit eating, drinking and smoking in contaminated areas.

### 7.2 Conditions for safe storage, including any incompatibilities

Store in a cool, dry, well ventilated area, removed from incompatible substances and foodstuffs. Ensure containers are adequately labelled, protected from physical damage and sealed when not in use.

### 7.3 Specific end use(s)

No information provided.

## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

### 8.1 Control parameters

#### Exposure standards

Ingredient	Reference	TWA		STEL	
		ppm	mg/m <sup>3</sup>	ppm	mg/m <sup>3</sup>
Titanium dioxide	SWA (AUS)	--	10	--	--
Zirconium compounds	SWA (AUS)	--	5	--	10

#### Biological limits

No biological limit values have been entered for this product.

### 8.2 Exposure controls

**Engineering controls** Avoid inhalation. Use in well ventilated areas. Mechanical extraction ventilation is recommended where an inhalation risk exists. Maintain dust levels below the recommended exposure standard.

#### PPE

**Eye / Face** Wear dust-proof goggles.

**Hands** Wear PVC or rubber gloves.

**Body** Wear coveralls when using large quantities or where heavy contamination is likely.

**Respiratory** Wear a Class P1 (Particulate) respirator where an inhalation risk exists. Wear a Powered Air Purifying Respirator (PAPR) with Class P3 (Particulate) filter or a Full-face Class P3 (Particulate) respirator at high dust levels.



## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

<b>Appearance</b>	DARK BROWN TO BLACK GRANULAR SOLID
<b>Odour</b>	ODOURLESS
<b>Flammability</b>	NON-FLAMMABLE
<b>Flash point</b>	NOT RELEVANT
<b>Boiling point</b>	NOT AVAILABLE
<b>Melting point</b>	1825°C
<b>Evaporation rate</b>	NOT AVAILABLE
<b>pH</b>	NEUTRAL
<b>Vapour density</b>	NOT AVAILABLE
<b>Specific gravity</b>	4.0 to 4.3
<b>Solubility (water)</b>	INSOLUBLE
<b>Vapour pressure</b>	NOT AVAILABLE
<b>Upper explosion limit</b>	NOT RELEVANT
<b>Lower explosion limit</b>	NOT RELEVANT
<b>Partition coefficient</b>	NOT AVAILABLE
<b>Auto-ignition temperature</b>	NOT AVAILABLE
<b>Decomposition temperature</b>	NOT AVAILABLE
<b>Viscosity</b>	NOT AVAILABLE
<b>Explosive properties</b>	NOT AVAILABLE
<b>Oxidising properties</b>	NOT AVAILABLE
<b>Odour threshold</b>	NOT AVAILABLE

### 9.2 Other information

<b>Bulk density</b>	2300 to 2500 kg/m <sup>3</sup>
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## 10. STABILITY AND REACTIVITY

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### 10.1 Reactivity

Carefully review all information provided in sections 10.2 to 10.6.

### 10.2 Chemical stability

Stable under recommended conditions of storage.

### 10.3 Possibility of hazardous reactions

Polymerisation is not expected to occur.

### 10.4 Conditions to avoid

Avoid contact with incompatible substances.

### 10.5 Incompatible materials

Incompatible with acids (e.g. nitric acid).

### 10.6 Hazardous decomposition products

May evolve toxic gases if heated to decomposition.

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## 11. TOXICOLOGICAL INFORMATION

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### 11.1 Information on toxicological effects

<b>Acute toxicity</b>	Non-toxic. There are no known hazards resulting from accidental ingestion of small amounts of rutile flour as may occur during normal handling. Ingestion of larger amounts may cause irritation to the gastro-intestinal system, mainly as a result of abrasion.
<b>Skin</b>	Not classified as a skin irritant. Contact may result in mechanical irritation.
<b>Eye</b>	Not classified as an eye irritant. Contact may result in mechanical irritation.
<b>Sensitisation</b>	This product is not known to be a skin or respiratory sensitiser.
<b>Mutagenicity</b>	No evidence of mutagenic effects.
<b>Carcinogenicity</b>	Not classifiable as a human carcinogen.
<b>Reproductive</b>	No evidence of reproductive effects.
<b>STOT – single exposure</b>	No known effects from this product.
<b>STOT – repeated exposure</b>	Rutile flour contains low levels of naturally occurring radioactive elements of the uranium and thorium series. It has typical specific activities of 0.05 to 0.65 Bq/g (thorium-232) and 0.2 to 0.75 Bq/g (uranium-238). Low level gamma radiation from bulk or bagged stockpiles of rutile flour can increase gamma levels slightly above normal background.
<b>Aspiration</b>	This product does not present an aspiration hazard.

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## 12. ECOLOGICAL INFORMATION

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### 12.1 Toxicity

This product is not anticipated to cause adverse effects to animal or plant life if released to the environment in small quantities.

### 12.2 Persistence and degradability

Not applicable.

### 12.3 Bioaccumulative potential

This product is not expected to bioaccumulate.

### 12.4 Mobility in soil

This product has low mobility in soil.

### 12.5 Other adverse effects

No information provided.

### 13. DISPOSAL CONSIDERATIONS

#### 13.1 Waste treatment methods

**Waste disposal** Ensure product is covered with moist soil to prevent dust generation and dispose at an approved landfill. Contact the manufacturer if additional information is required.

**Legislation** Dispose of in accordance with relevant local legislation.

### 14. TRANSPORT INFORMATION

**NOT CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE, IMDG OR IATA**

	<b>LAND TRANSPORT (ADG)</b>	<b>SEA TRANSPORT (IMDG / IMO)</b>	<b>AIR TRANSPORT (IATA / ICAO)</b>
<b>14.1 UN Number</b>	None Allocated	None Allocated	None Allocated
<b>14.2 Proper Shipping Name</b>	None Allocated	None Allocated	None Allocated
<b>14.3 Transport hazard class</b>	None Allocated	None Allocated	None Allocated
<b>14.4 Packing Group</b>	None Allocated	None Allocated	None Allocated

**14.5 Environmental hazards** No information provided

#### 14.6 Special precautions for user

**Hazchem code** None Allocated

### 15. REGULATORY INFORMATION

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

**Poison schedule** A poison schedule number has not been allocated to this product using the criteria in the Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP).

**Classifications** Safework Australia criteria are based on the Globally Harmonised System (GHS) of Classification and Labelling of Chemicals.  
The classifications and phrases listed below are based on the Approved Criteria for Classifying Hazardous Substances [NOHSC: 1008(2004)].

**Hazard codes** None allocated.

**Risk phrases** None allocated.

**Safety phrases** None allocated.

**Inventory listing(s)** **AUSTRALIA: AICS (Australian Inventory of Chemical Substances)**  
All components are listed on AICS, or are exempt.

### 16. OTHER INFORMATION

**Additional information** **RESPIRATORS:** In general, the use of respirators should be limited and engineering controls employed to avoid exposure. If respiratory equipment must be worn ensure correct respirator selection and training is undertaken. Some respirators may be uncomfortable when used for long periods. The use of air powered or air supplied respirators should be considered where prolonged or repeated use is necessary.

**PERSONAL PROTECTIVE EQUIPMENT GUIDELINES:**  
The recommendation for protective equipment contained within this report is provided as a guide only. Factors such as method of application, working environment, quantity used, product concentration and the availability of engineering controls should be considered before final selection of personal protective equipment is made.

**HEALTH EFFECTS FROM EXPOSURE:**  
The effects from exposure to this product will depend on several factors including frequency and duration of use; quantity used; effectiveness of control measures; protective equipment used and method of application. Given that it is impractical to prepare a report that would encompass all possible scenarios, it is anticipated that users will assess the risks and apply control methods where appropriate.

**PRODUCT NAME    STANDARD GRADE RUTILE SAND**

**Abbreviations**

ACGIH	American Conference of Governmental Industrial Hygienists
CAS #	Chemical Abstract Service number - used to uniquely identify chemical compounds
CNS	Central Nervous System
EC No.	EC No - European Community Number
GHS	Globally Harmonized System
IARC	International Agency for Research on Cancer
LC50	Lethal Concentration, 50% / Median Lethal Concentration
LD50	Lethal Dose, 50% / Median Lethal Dose
mg/m <sup>3</sup>	Milligrams per Cubic Metre
OEL	Occupational Exposure Limit
PEL	Permissible Exposure Limit
pH	Relates to hydrogen ion concentration using a scale of 0 (high acidic) to 14 (highly alkaline)
ppm	Parts Per Million
REACH	Regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals
STEL	Short-Term Exposure Limit
STOT-RE	Specific target organ toxicity (repeated exposure)
STOT-SE	Specific target organ toxicity (single exposure)
SUSMP	Standard for the Uniform Scheduling of Medicines and Poisons
SWA	Safe Work Australia
TLV	Threshold Limit Value
TWA	Time Weighted Average

**Revision history**

Revision	Description
1.0	Initial SDS creation
2.0	Supplier address updated
3.0	Align with Sierra Rutile after demerger

**Report status**

This document represents the current state of knowledge as to the appropriate safety and handling precautions for the product at the time of issue. Further clarification regarding any aspect of the product should be obtained directly from the manufacturer, importer or supplier.

While all due care has been taken to include accurate and up-to-date information in this SDS, Sierra Rutile Limited does not provide any warranty as to accuracy or completeness and accepts no liability for any loss, injury or damage (including consequential loss) that may be suffered or incurred by any person as a consequence of their reliance on the information contained in this SDS.

**Prepared by**

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**Revision:** 3  
**SDS date:** 2 August 2022

**[ End of SDS ]**

<b>Document Title:</b> Material Safety Data Sheet – Rutile		<b>Page No:</b> 1 of 8
<b>Doc No:</b> GQTableMark001c	<b>Rev No:</b> 0012	<b>Compiled by:</b> HJ Burger
<b>Approved by:</b> Marketing Manager		<b>Effective date:</b> August 2018

## Safety Data Sheet

### Rutile

#### 1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND THE COMPANY / UNDERTANKING

##### 1.1 Product Identifier

Common/Trade Name:	Rutile
Other means of Identification	Rutile sand
EC Number	215-282-2
CAS Number	1317-80-2
REACH number	This product is exempt from registration according to the provision of Article 2(7) (b) and Annex V (7) of REACH.
Harmonized Tariff Code	2614.00.00.5
Product Description	Solid, natural occurring mineral, sand – like material
Product Type	Solid

##### 1.2 Relevant identified uses if the substance / mixture and uses advised against

Material uses	Industrial applications raw materials for the titanium dioxide pigment industry, titanium tetrachloride, titanium metal industry and welding rods.
Uses advised against	None known

##### 1.3 DETAILS OF THE SUPPLIER OF THE MATERIAL SAFETY DATA SHEET (SDS)

Company	Tronox Mineral Sands (Pty) Ltd
Address	River Falls Office Park Ground Floor, Wild Pear Building Doornkloof, Centurion, 0157, South Africa
Business Unit(s)	Namakwa Sands and KZN Sands
Email address of person responsible f	<a href="mailto:hennie.burger@tronox.com">hennie.burger@tronox.com</a>

##### 1.4 Emergency telephone number

Telephone	+27 83 609 1252
Information limitations	Not applicable

#### 2. HAZARDS IDENTIFICATION

##### 2.1 Classification of the substance or mixture

Classification according to EU EC 1272/2008 (CLPGHS) or UN GHS:	Not classified
Physical and chemical hazards	Not classified
Human health hazards	Not classified
Environmental hazards	Not classified
Classification per EU EC 1272/2008 (CLPGHS) or UN GHS:	Not classified

##### 2.1 Label Elements

Not classified - pictogram is not required  
 Not classified - signal word, hazard statements, precautionary statement is not applicable

##### 2.2 Other hazards not leading to classification

The principal hazard is due to inhalation of dust. The normal grain size of rutile precludes it from being an inhalation hazard. Avoid the creation of dust during handling and processing.



<b>Document Title:</b> Material Safety Data Sheet – Rutile		<b>Page No:</b> 2 of 8
<b>Doc No:</b> GQTableMark001c	<b>Rev No:</b> 0012	<b>Compiled by:</b> HJ Burger
<b>Approved by:</b> Marketing Manager		<b>Effective date:</b> August 2018

With some products, certain processes (e.g. grinding, drying), airborne respirable crystalline silica (quartz) may be generated. Prolonged and/or massive inhalation of respirable crystalline silica may cause lung fibrosis, commonly referred to as silicosis. Principal symptoms of silicosis are cough and breathlessness. Occupational exposure to respirable crystalline silica dust should be monitored and controlled.

US Specific: for Crystalline Silica >0.1%: Statement regarding IARC classification Contains >0.1% crystalline silica which in the form of quartz or cristobalite dust is regarded by IARC as carcinogenic to humans (Group 1).

US Specific: Additional consideration is need from radio-nuclides (section 3).

### 3. COMPOSITION / INFORMATION ON INGREDIENTS

#### 3.1 Substance / mixture

Name	CAS No.	Typical content	GHS classification
Rutile (TiO <sub>2</sub> )	1317-80-2	84 - 94%	Not classified
Leucoxene	121173-81-8	4 - 14%	Not classified
Zircon (ZrSiO <sub>4</sub> )	14940-68-2	0.5 - 2.0%	Not classified
Quartz	14808-60-7	0.5 - 2 %	Not classified
Ilmenite	12168-52-4	<1%	Not classified

#### Additional Information:

This material is a naturally occurring radioactive material (NORM) and is considered a radioactive product (IAEA radioactive material if above 1Bq/g), however it is not considered a radioactive product for transportation purpose, limit of 10Bq/g for NORM. Some countries may use different limits; therefore, local regulations should be consulted for the latest requirements.

Uranium 285 – 343 ppm 3.5 – 4.3 Bq/g Uranium - 238

Thorium 116 – 157 ppm 0.5 – 0.6 Bq/g Thorium – 232

Other daughter nuclides are in secular equilibrium.

The typical gamma radiation dose rate on rutile bags is less than 1µSv/h (<0.1mRem/h), above the background. A person may work in dust concentrations of ≤10mg/m<sup>3</sup> for a full year without exceeding the maximum dose for a worker.

### 4. FIRST AID MEASURES

#### 4.1 Description of first aid measures

Eye contact:	Rinse gently with water for several minutes. Remove contact lenses if applicable. Get medical attention if irritation occurs.
Inhalation:	Remove person to fresh air and keep comfortable for breathing. Get medical attention if symptoms occur.
Skin Contact:	Wash with soap and water. Get medical attention if symptoms occur.
Ingestion:	If swallowed, rinse mouth with water. Get medical attention if symptoms occur.
Self-protection of the first aider:	No special protection is required. See Section 8 for information on appropriate personal protective equipment.

<b>Document Title:</b> Material Safety Data Sheet – Rutile		<b>Page No:</b> 3 of 8
<b>Doc No:</b> GQTableMark001c	<b>Rev No:</b> 0012	<b>Compiled by:</b> HJ Burger
<b>Approved by:</b> Marketing Manager		<b>Effective date:</b> August 2018

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

Potential acute health effects:

Eye contact:	No known significant effects or critical hazards.
Inhalation:	No known significant effects or critical hazards.
Skin contact:	No known significant effects or critical hazards.
Ingestion:	No known significant effects or critical hazards.

Over-exposure signs/symptoms:

Eye contact:	No specific data
Inhalation:	No specific data
Skin contact:	No specific data
Ingestion:	No specific data

#### 4.3 Indications of any immediate medical attention and special treatment needed

Notes to physician: Treat symptomatically. No specific treatment

### 5. FIREFIGHTING MEASURES

#### 5.1 Extinguishing Media

Suitable extinguishing media:	Use an extinguishing agent suitable for the surrounding fire.
Unsuitable extinguishing media:	No specific data.

#### 5.2 Special exposure hazards arising from the from the substance or mixture

Hazards from the substance or mixture:	No specific fire or explosion hazard.
Hazards combustion products:	None known.

#### 5.3 Advice for fire-fighters

No fire or explosion hazard exists. Fire fighters should wear appropriate protective equipment to minimize inhalation of dust.

### 6. ACCIDENTAL RELEASE MEASURES

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

For non-emergency personnel:	Wear personal protective equipment (PPE) as detailed in section 8. Clear the area of unprotected personnel. Contact emergency services if appropriate.
For emergency responders:	Wear personal protective equipment (PPE) as detailed in section 8.

#### 6.2 Environmental precautions

Environmental precautions Prevent spilled product from entering sewers, drains and waterways.

#### 6.3 Methods and material for containments and cleaning up:

Wear safety equipment as for normal handling. Avoid generating dust. Vacuum up if possible, otherwise carefully sweep up small spills and re-cycle. If the spilled product is not suitable for re-use, damp down, collect and where possible return to manufacturer for reprocessing. If necessary, dispose of to an approved landfill site in accordance with applicable local regulations.

#### 6.4 Reference to other sections:

See sections 8 and 13 for exposure controls (PPE) and waste disposal

<b>Document Title:</b> Material Safety Data Sheet – Rutile		<b>Page No:</b> 4 of 8
<b>Doc No:</b> GQTableMark001c	<b>Rev No:</b> 0012	<b>Compiled by:</b> HJ Burger
<b>Approved by:</b> Marketing Manager		<b>Effective date:</b> August 2018

## 7. HANDLING AND STORAGE

### 7.1 Precautions for safe handling

Avoid the creation of dust and prevent wind dispersal. Use of safe work practices are recommended to avoid inhalation, eye or skin contact. Observe good personal hygiene at all times, including washing hands before eating. Prohibit eating, drinking and smoking in contaminated areas. Avoid breathing dust. Avoid contact with eyes. Wash hands thoroughly after handling the product.

### 7.2 Conditions for safe storage, including any incompatibilities

Store in accordance with local regulations where applicable. Store in a cool, dry, well ventilated area, to avoid dust generation and dispersal and removed from foodstuffs. Ensure bags are adequately labelled, protected from physical damage and sealed when not in use.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Control Parameters

Product/ingredient name	Exposure limit values
Quartz (SiO <sub>2</sub> )	<p><b>Generic OEL: ACGIH TLV (United States, 2/2010).</b> TWA: 0.025 mg/m<sup>3</sup> 8 hour(s). Form: Respirable fraction; see</p> <p><b>US specific:</b> OSHA PEL Z3 (United States, 2/2016). TWA: 250 mppcf / (%SiO<sub>2</sub>+5) 8 hours. Form: Respirable TWA: 10 mg/m<sup>3</sup> / (%SiO<sub>2</sub>+2) 8 hours. Form: Respirable TWA: 30 mg/m<sup>3</sup> / (%SiO<sub>2</sub>+2) 8 hours. Form: Total Dust <b>NIOSH REL (United States, 10/2013).</b> TWA: 0.05 mg/m<sup>3</sup> 10 hours. Form: Respirable dust</p>

**Recommended monitoring procedures:** This product contains ingredients with exposure limits, and therefore personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment. Reference to national guidance documents for methods for the determination of hazardous substances will also be required.

<b>US Specific</b>	OSHA Occupational Exposure to Respirable Crystalline Silica Updated Rule 29 CFR Parts 1910, 1915, and 1926
<b>DNEL:</b>	not available
<b>PNEC:</b>	not available

### 8.2 Exposure controls

Appropriate engineering controls: Good general ventilation should be sufficient to control worker exposure to airborne contaminants. If user operations generate dust, fumes, gas, vapour or mist, use process enclosures, local exhaust ventilation (LEV) or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Individual protection measures, such as personal protective equipment:

Eye protection	Wear safety glasses in normal conditions. Wear dust-proof goggles in dusty conditions
Skin protection	Hand protection: wear industrial grade gloves. Other skin protection: wear disposable coveralls where heavy contamination is likely.
Respiratory protection	Where an inhalation risk exists, wear a Class P1 (Particulate) respirator.
Thermal hazards	No thermal hazard exists

### 8.3 Environmental exposure controls



<b>Document Title:</b> Material Safety Data Sheet – Rutile		<b>Page No:</b> 5 of 8
<b>Doc No:</b> GQTableMark001c	<b>Rev No:</b> 0012	<b>Compiled by:</b> HJ Burger
<b>Approved by:</b> Marketing Manager		<b>Effective date:</b> August 2018

Encourage the re-use of uncontaminated product. Use local exhaust ventilation (LEV) to prevent/reduce air emissions. Emissions trapped from LEV should be re-used where possible. Solid waste that cannot be re-used should be disposed of according to the local laws and regulations. Avoid creating dust and prevent wind dispersal.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

a) Appearance	Brownish red
b) Odour	Odourless
c) Odour threshold	Not applicable
d) pH	Not applicable
e) Melting point/freezing point	1850 °C
f) Initial boiling point and boiling range	Not applicable
g) Flash point	Not applicable
h) Evaporation rate	Not applicable
i) Flammability (solid, gas);	Not applicable
j) Upper/lower flammability or explosive limits	Not applicable
k) Vapour pressure;	Not applicable
l) Vapour density	Not applicable
m) Relative density	2.4-2.5 g/cm <sup>3</sup>
n) Solubility(ies);	Insoluble in: cold water, hot water, methanol, diethyl ether, n-octanol and acetone.
o) Partition coefficient: n-octanol/water;	Not applicable
p) Auto-ignition temperature	Not applicable
q) Decomposition temperature;	Not applicable
r) Viscosity	Not applicable
s) Explosive properties	Not applicable
t) Oxidising properties	Not applicable
u) Granulometry	d <sub>50</sub> : 105 µm
v) Angle of repose	37.5°

### 9.2 Other Information

No additional information.

## 10. STABILITY AND REACTIVITY

<b>10.1 Reactivity:</b>	No specific test data related to reactivity available for this product or its ingredients.
<b>10.2 Chemical Stability:</b>	This product is chemically stable.
<b>10.3 Possibility of hazardous reactions:</b>	Under normal conditions of storage and use, hazardous reactions will occur.
<b>10.4 Conditions to avoid:</b>	No conditions to avoid
<b>10.5 Incompatible materials:</b>	None known
<b>10.6 Hazardous decomposition products:</b>	Under normal conditions of storage and use, hazardous decomposition products should not be produced.

<b>Document Title:</b> Material Safety Data Sheet – Rutile		<b>Page No:</b> 6 of 8
<b>Doc No:</b> GQTableMark001c	<b>Rev No:</b> 0012	<b>Compiled by:</b> HJ Burger
<b>Approved by:</b> Marketing Manager		<b>Effective date:</b> August 2018

## 11. TOXICOLOGY INFORMATION

### 11.1 Information on Toxicological Effects

- |                                       |   |
|---------------------------------------|---|
| a. Acute toxicity:                    | No concerns from absorption, metabolism, distribution and excretion. An inert substance with extremely low toxicity to humans and animals |
| b. Skin corrosion / irritation:       | Non-irritating to the skin  |
| c. Serious eye damage / irritation:   | Non-irritating to the eyes  |
| d. Respiratory or skin sensitization: | Non-sensitizer to the respiratory system or skin  |
| e. Germ cell mutagenicity:            | Not mutagenic (Ames test)   |
| f. Carcinogenicity:                   | Data not available  |
| g. Reproductive toxicity:             | Data not available  |
| h. STOT-single exposure:              | Data not available  |
| i. STOT-repeated exposure:            | Data not available  |

**11.2 Information on likely routes of exposure:** Likely of exposure anticipated: dermal, inhalation, oral

### 11.3 Potential acute health effects

- |                      |   |
|----------------------|---|
| <b>Eye contact:</b>  | No known significant effects or critical hazards. |
| <b>Inhalation:</b>   | No known significant effects or critical hazards. |
| <b>Skin contact:</b> | No known significant effects or critical hazards  |
| <b>Ingestion:</b>    | No known significant effects or critical hazards. |

### 11.4 Symptoms related to the physical, chemical and toxicological characteristics

- |                     |                  |
|---------------------|------------------|
| <b>Eye contact:</b> | No specific data |
| <b>Inhalation:</b>  | No specific data |
| <b>Skin contact</b> | No specific data |
| <b>Ingestion:</b>   | No specific data |

### 11.5 Delayed and immediate effects as well as chronic effects from short and long-term exposure

#### Short-term exposure:

- |                              |               |
|------------------------------|---------------|
| Potential immediate effects: | Not available |
| Potential delayed effects:   | Not available |

#### Long-term exposure:

- |                              |               |
|------------------------------|---------------|
| Potential immediate effects: | Not available |
| Potential delayed effects:   | Not available |

**11.6 Potential chronic health effects:** Not available

### 11.7 Conclusion/Summary

Prolonged and/or massive exposure to respirable crystalline silica-containing dust may cause silicosis, a nodular pulmonary fibrosis caused by deposition in the lungs of fine respirable particles of crystalline silica.

- |                  |  |
|------------------|--|
| General:         | No known significant effects or critical hazards |
| Carcinogenicity: | No known significant effects or critical hazards |
| Mutagenicity:    | No known significant effects or critical hazards |
| Teratogenicity:  | No known significant effects or critical hazards |

<b>Document Title:</b> Material Safety Data Sheet – Rutile		<b>Page No:</b> 7 of 8
<b>Doc No:</b> GQTableMark001c	<b>Rev No:</b> 0012	<b>Compiled by:</b> HJ Burger
<b>Approved by:</b> Marketing Manager		<b>Effective date:</b> August 2018

Developmental effects: No known significant effects or critical hazards  
 Fertility effects: No known significant effects or critical hazards

**11.8 Other information:**

Prolonged and/or massive exposure to respirable crystalline silica-containing dust may cause silicosis, a nodular pulmonary fibrosis caused by deposition in the lungs of fine respirable particles of crystalline silica.  
 In 1997, IARC (the International Agency for Research on Cancer) concluded that crystalline silica inhaled from occupational sources can cause lung cancer in humans. However, it pointed out that not all industrial circumstances, nor all crystalline silica types, were to be incriminated. (IARC Monographs on the evaluation of the carcinogenic risks of chemicals to humans, Silica, silicates dust and organic fibres, 1997, Vol. 68, IARC, Lyon, France.)  
 In June 2003, EU SCOEL (the EU Scientific Committee on Occupational Exposure Limits) concluded that the main effect in humans of the inhalation of respirable crystalline silica dust is silicosis. "There is sufficient information to conclude that the relative risk of lung cancer is increased in persons with silicosis (and, apparently, not in employees without silicosis exposed to silica dust in quarries and in the ceramic industry). Therefore, preventing the onset of silicosis will also reduce the cancer risk... (SCOEL SUM Doc 94-final, June 2003). So, there is a body of evidence supporting the fact that increased cancer risk would be limited to people already suffering from silicosis. Worker protection against silicosis should be assured by respecting the existing regulatory occupational exposure limits and implementing additional risk management measures where required (see section 16 below).

**12. ECOLOGICAL INFORMATION**

12.1 **Toxicity:** No known significant effects or critical hazards  
 12.2 **Persistence and degradability:** Inorganic; not readily biodegradable  
 12.3 **Bioaccumulation potential:** Not applicable  
 12.4 **Mobility in soil:** Not applicable  
 12.5 **Results on PBT and** PBT: not available  
 12.6 **vPvB assessment:** vPvB: not available

**13. DISPOSAL CONSIDERATION**

13.1 **Waste Treatment Methods**  
 Method of disposal: Recycle if possible. The generation of waste should be avoided or minimized whenever possible. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal should always comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements.  
 Hazardous waste: Within the present knowledge of the supplier, this product is not regarded as hazardous waste, as defined by the EU Directive 91/689/EEC. Local definitions of hazardous waste should be consulted in other jurisdictions.  
 Special precautions: The product and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Avoid dispersal of spilt material and runoff to soil, waterways, drains and sewers.

**14. TRANSPORT INFORMATION**

14.1 **UN Number:** Not regulated as a dangerous good for transport  
 14.2 **UN proper shipping name:** Not applicable  
 14.3 **Transport hazard class(es):** None applicable  
 14.4 **Packing group:** Not applicable



<b>Document Title:</b> Material Safety Data Sheet – Rutile		<b>Page No:</b> 8 of 8
<b>Doc No:</b> GQTableMark001c	<b>Rev No:</b> 0012	<b>Compiled by:</b> HJ Burger
<b>Approved by:</b> Marketing Manager		<b>Effective date:</b> August 2018

- 14.5 Environmental hazards:** None applicable. Not a marine pollutant.
- 14.6 Special precautions for user:** See Sections 6.1 and 7.1
- 14.7 Transport in bulk according to Annex II of MARPOL and the IBC Code:** Referenced in IMSBC as Rutile Sand, Group C material.

## 15. REGULATORY INFORMATION

- 15.1 Safety, health and environmental regulations / legislation specific or the substance or mixture:**  
Not applicable as the substance is not classified according to GHS.
- 15.2 Chemical safety assessment**  
This is EU specific and not needed elsewhere. Substance is not classified therefore no Chemical Safety Assessment has been carried out for this product by the supplier.

## 16. OTHER INFORMATION

\*Indicates information that has been changed from previously issued version.

Date of issue/date of revision	3 August 2018
Date of previous issue:	15/06/2015
Version:	012
Abbreviations and acronyms:	ATE = Acute Toxicity Estimate CLP = Classification, Labelling and Packaging Regulation [Regulation (EC) No. 1272/2008] DNEL = Derived No Effect Level EUH statement = CLP – specific Hazard statement PNEC = Predicted No Effect Concentration RPN = Reach Registration Number

### Disclaimer

The information contained in this SDS is to the best of our knowledge accurate. Tronox Mineral Sands (Pty) Ltd, its employees, directors, agents, subsidiaries, affiliates or related companies shall not assume any liability of whatsoever cause (including consequential damages) for the accuracy or completeness of the information contained in this SDS. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with cautions. Although hazards are described herein, we cannot guarantee that these are the only hazards that exist.

<b>Document Title:</b> Safety Data Sheet – Chloride Slag		<b>Page No:</b> 1 of 10
<b>Doc No:</b> GQTableMark001g	<b>Rev No:</b> 007	<b>Compiled by:</b> HJ Burger
<b>Approved by:</b> Marketing Manager		<b>Effective date:</b> August 2018

## Safety Data Sheet

### Chloride Slag

#### SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

##### 1.1 PRODUCT IDENTIFIER

Common/Trade Name:	:	Chloride Slag, CP Slag, TiO <sub>2</sub> Slag, Upgraded Ilmenite (UGI)
EC Number	:	293-671-6
REACH Registration Number	:	01-2119474683-29-0003
Legal Entity (REACH, Only Representative)	:	Tronox Pigments (Holland) BV.
CAS Number	:	91081-64-0
Harmonized Tariff Code	:	2618.00.00.8
Product Description	:	UGI (Upgraded ilmenite) is produced during smelting (rock or sand). Consists primarily of a titanate phase.
Other means of identification	:	UGI, upgraded ilmenite, titanium slag, slag ilmenite electrothermal smelting. TiO <sub>2</sub> slag
Chemical formula	:	M <sub>3</sub> O <sub>5</sub> , M = Majority TiO <sub>2</sub>

##### 1.2 RELEVANT IDENTIFIED USES OF THE SUBSTANCE/MIXTURE AND USES ADVISED AGAINST

Identified uses	:	Production of UGI SU8 / PC19 / PROC 2, 3, 4, 8b, 22, 26 / ERC1
		Production of titanium dioxide SU / PC 9a / PROC 2, 3, 4, 8b, 14, 22, 26 / ERC 1
		Production of titanium tetrachloride SU8 / PROC 2, 3, 4, 8b, / ERC 1
		Production of titanium metal SU14 / PROC 1, 8b, 22, 26 / ERC 1
		Production of ferro-titanium alloys SU14/Proc 2, 3, 4, 8b, 22, 26 / ERC1

Please refer to the ECHA website for more details regarding the meaning of the codes.

##### 1.3 DETAILS OF THE SUPPLIER OF THE SAFETY DATA SHEET (SDS)

Company	Tronox Mineral Sands (Pty) Ltd
	River Falls Office Park Ground Floor, Wild Pear Building Doornkloof, Centurion, 0157, South Africa
Email address of person responsible for this SDS	<a href="mailto:hennie.burger@tronox.com">hennie.burger@tronox.com</a>

##### 1.4 EMERGENCY TELEPHONE NUMBER

Telephone	:	+27 83 609 1252
Information limitations	:	Not applicable

#### SECTION 2: HAZARDS IDENTIFICATION

##### 2.1 CLASSIFICATION OF THE SUBSTANCE OR MIXTURE

Product definition	:	Mono-constituent substance
Classification according to Regulation	:	Not classified



<b>Document Title:</b> Safety Data Sheet – Chloride Slag		<b>Page No:</b> 2 of 10
<b>Doc No:</b> GQTableMark001g	<b>Rev No:</b> 007	<b>Compiled by:</b> HJ Burger
<b>Approved by:</b> Marketing Manager		<b>Effective date:</b> August 2018

(EC) Number 1272/2008 (CLP/GHIS)

Classification according to Directive 67/548/EEC (DSD) : Not classified

See Section 16 for the full text of the R phrases or H statements declared above.

See Section 11 for more detailed information on health effects and symptoms.

## 2.2 LABEL ELEMENTS

Signal word : No signal word

Other hazards which do not result in classification : When converted to Titanium Dioxide Pigment by downstream users, airborne particles may be generated. Titanium dioxide was classified as possible carcinogens, IARC 2B (based on animal studies, particle overload, however, in human epidemiological study all is negative)

## SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

Substance/mixture : Mono-constituent substance

PRODUCT/INGREDIENT NAME	IDENTIFIERS	%	CLASSIFICATION		TYPE
			67/548/EEC	REGULATION (EC) NO 1272/2008 (CLP)	
UGI (Upgraded Ilmenite) or TiO <sub>2</sub> Slag	REACH No. 012119474683-29-0003 EC 293-671-6 CAS: 91081-64-0	100	Not classified	Not classified	(A)

Additional information : The UGI composition comprises of a titanate and a glassy silicate phase. The titanate phase, which represents 91-99% (w/w), is a solid solution predominantly arranged in a dual pseudobrookite-karrooite crystal structure where it is not possible to identify the major, minor and trace elements as free oxides. Some rutile is also present in this phase (in high purity UGI, rutile is dominant in the titanate phase). The glassy silicate phase, which represents in general < 5% (but can go up to 9%) is in the form of small inclusions within the titanate phase. UGI titanium content is often commercially expressed in terms of TiO<sub>2</sub> equivalent for which UGI has a minimum equivalent of 78%. The major impurities found in both phases of UGI are iron, aluminium, calcium, magnesium, manganese, chromium and vanadium.

For more details on the composition, please refer to the Certificate of Analysis.

There are no additional ingredients present which, within the current knowledge of the supplier, are classified and contribute to the classification of the substance and hence require reporting in this section.

Occupational exposure limits, if available are listed in Section 8.



<b>Document Title:</b> Safety Data Sheet – Chloride Slag		<b>Page No:</b> 3 of 10
<b>Doc No:</b> GQTableMark001g	<b>Rev No:</b> 007	<b>Compiled by:</b> HJ Burger
<b>Approved by:</b> Marketing Manager		<b>Effective date:</b> August 2018

#### SECTION 4: FIRST AID AND MEASURES

##### 4.1 DESCRIPTION OF FIRST AID MEASURES

Eye contact	:	Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Get medical attention if irritation occurs.
Inhalation	:	Move exposed person to fresh air. Get medical attention if symptoms occur
Skin Contact	:	Wash with soap and water. Get medical attention if symptoms occur
Ingestion	:	Wash out mouth with water. Get medical attention if symptoms occur
Protection of first aiders	:	No special protection is required. See Section 8 for information on appropriate personal protective equipment

##### 4.2 MOST IMPORTANT SYMPTOMS AND EFFECTS, BOTH ACUTE AND DELAYED

###### Potential acute health effects

- Eye contact	:	No known significant effects or critical hazards
- Inhalation	:	No known significant effects or critical hazards
- Skin contact	:	No known significant effects or critical hazards
- Ingestion	:	No known significant effects or critical hazards

###### Over-exposure signs/symptoms

- Eye contact	:	No specific data
- Inhalation	:	No specific data
- Skin contact	:	No specific data
- Ingestion	:	No specific data

##### 4.3 INDICATION OF ANY IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT NEEDED

Notes to physician	:	Treat symptomatically. No specific treatment
Specific treatments	:	No specific treatment

#### SECTION 5: FIREFIGHTING MEASURES

##### 5.1 EXTINGUISHING MEDIA

Suitable extinguishing media	:	Use an extinguishing agent suitable for the surrounding fire
Unsuitable extinguishing media	:	None known

##### 5.2 SPECIAL HAZARDS ARISING FROM THE SUBSTANCE OR MIXTURE

Hazards from the substance or mixture	:	No specific fire or explosion hazard
Hazardous combustion products	:	None

##### 5.3 ADVICE FOR FIRE-FIGHTERS

Special protective equipment for fire-fighters	:	Fire fighters should wear appropriate protective equipment
--	---	--

#### SECTION 6: ACCIDENTAL RELEASE MEASURES

##### 6.1 PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT AND EMERGENCY PROCEDURES

For non-emergency personnel	:	Put on appropriate personal protective equipment (see Section 8)
For non-emergency personnel	:	Put on appropriate personal protective equipment. (see Section 8)



<b>Document Title:</b> Safety Data Sheet – Chloride Slag		<b>Page No:</b> 4 of 10
<b>Doc No:</b> GQTableMark001g	<b>Rev No:</b> 007	<b>Compiled by:</b> HJ Burger
<b>Approved by:</b> Marketing Manager		<b>Effective date:</b> August 2018

## 6.2 ENVIRONMENTAL PRECAUTIONS

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers

## 6.3 METHODS AND MATERIALS FOR CONTAINMENT AND CLEANING UP

Small spills : Recycle if possible. Waste must be disposed of according to applicable regulations

Large spills : Recycle if possible. Waste must be disposed of according to applicable regulations. Avoid creating dusty conditions and prevent wind dispersal

## 6.4 REFERENCE TO OTHER SECTIONS

Reference to other sections : See Section 1 for emergency contact information  
See Section 8 for information on appropriate personal protective equipment  
See Section 13 for additional waste treatment information

## SECTION 7: HANDLING AND STORAGE

**7.1 PRECAUTIONS FOR SAFE HANDLING** Protective measures : Avoid creating dusty conditions and prevent wind dispersal. Put on appropriate personal protective equipment (see Section 8). Workers should wash hands and face before eating, drinking and smoking

## 7.2 CONDITIONS FOR SAFE STORAGE, INCLUDING ANY INCOMPATIBILITIES

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Avoid creating dusty conditions and prevent wind dispersal

## SECTION 8: EXPOSURE CONTROLS

**8.1 CONTROL PARAMETERS** Occupational exposure limits : No exposure limit value known

## 8.2 EXPOSURE CONTROLS

Appropriate engineering controls : Good general ventilation should be sufficient to control worker exposure to airborne contaminants. If this product contains ingredients with exposure limits, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Individual protection measures

- Eye protection : Safety eyewear should be used when there is a likelihood of Exposure. Recommended: safety glasses
- Skin protection : Wear suitable gloves.
- Body protection : No special protective clothing required. Recommended: Overall
- Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory protection : Use a properly fitted, air purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Environmental exposure controls : Avoid creating dusty conditions and prevent wind dispersal



<b>Document Title:</b> Safety Data Sheet – Chloride Slag		<b>Page No:</b> 5 of 10
<b>Doc No:</b> GQTableMark001g	<b>Rev No:</b> 007	<b>Compiled by:</b> HJ Burger
<b>Approved by:</b> Marketing Manager		<b>Effective date:</b> August 2018

Personal Protective Equipment (PPE) :



## SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 INFORMATION ON BASIC PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	Solid (Granular solid)
- Physical state	:	Solid (Granular solid)
- Colour	:	Black
- Odour	:	Odourless
- Odour threshold	:	Not applicable
- pH	:	8
- Melting point/freezing point	:	1550 - 1850 °C
- Initial boiling point and boiling range	:	Not applicable
- Flash point	:	Not applicable
- Evaporation rate	:	Not applicable
- Flammability (solid, gas)	:	Not applicable
- Burning time	:	Not applicable
- Burning rate	:	Not applicable
- Upper/lower flammability or explosive limits	:	Not applicable
- Vapour pressure	:	Not applicable
- Vapour density	:	Not applicable
- Bulk density	:	Not applicable
- Granulometry	:	1.9 – 2.5 cm <sup>3</sup>
- Relative density	:	55 – 800 Microns
- Solubility(ies)	:	3.6 – 4.1
		Insoluble in the following materials: cold water and hot water, methanol, diethyl ether, n-octanol and acetone
- Partition coefficient: n-octanol/water	:	Not applicable
- Auto-ignition temperature	:	Not applicable
- Decomposition temperature	:	Not applicable
- Viscosity	:	Not applicable
- Explosive properties	:	Not applicable
- Oxidizing properties	:	Not applicable

### 9.2 OTHER INFORMATION

Other information : No additional information

## SECTION 10: STABILITY AND REACTIVITY

10.1	Reactivity	:	No specific test data related to reactivity available for this product or its ingredients
10.2	Chemical Stability	:	The product is stable
10.3	Possibility of hazardous reactions	:	Under normal conditions of storage and use, hazardous reactions will not occur
10.4	Conditions to avoid	:	None known
10.5	Incompatible materials	:	None known
10.6	Hazardous decomposition products	:	Under normal conditions of storage and use, hazardous decomposition should not be produces

<b>Document Title:</b> Safety Data Sheet – Chloride Slag		<b>Page No:</b> 6 of 10
<b>Doc No:</b> GQTableMark001g	<b>Rev No:</b> 007	<b>Compiled by:</b> HJ Burger
<b>Approved by:</b> Marketing Manager		<b>Effective date:</b> August 2018

**SECTION 11: TOXICOLOGY INFORMATION**  
**11.1 INFORMATION ON TOXICOLOGICAL EFFECTS**

Acute Toxicity

PRODUCT/INGREDIENT NAME	RESULT	SPECIES	DOSE	EXPOSURE
UGI	LD50 Oral	Rat	> 2000 mg/kg	-

Conclusion/Summary : Acute toxicity inhalation: Testing could not be initiated (OECD Guideline 403. EPA OPPTS 870.1300)

Irritation/Corrosion

PRODUCT/INGREDIENT NAME	RESULT	SPECIES	SCORE	EXPOSURE	OBSERVATION
UGI	Eyes – Redness of the conjunctivae	Rabbit	0	24 hours 100 mg	72 hours
	Skin – Primary dermal irritation index (PDII)	Rabbit	0	4 hours 500 mg/kg	72 hours

Conclusion/Summary  
Skin : Non irritating to the skin. OECD 404  
Eyes : Non irritating to the eyes. OECD 405  
Respiratory : Non irritating to the respiratory system

Sensitizer

Conclusion/Summary  
- Skin : Non sensitizer to skin. OECD 406

Mutagenic

Conclusion/Summary : No mutagenic effect

Carcinogenicity

Conclusion/Summary : When converted to Titanium dioxide pigments by downstream Users, airborne particles may be generated. Titanium dioxide was classified as possible carcinogens, IARC 2B (based on animal studies, particle overload. However, in human epidemiology studies all negative)

Reproductive Toxicity

Conclusion/Summary : No known significant effects or critical hazards

Teratogenicity

Conclusion/Summary : No known significant effects or critical hazards

Specific target organ toxicity (single exposure) : Not available

Specific target organ toxicity (repeated exposure) : Not available

Aspiration hazard : Not available

Information on the likely route of exposure : Route of entry anticipated: Oral, Dermal and Inhalation



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<b>Document Title:</b> Safety Data Sheet – Chloride Slag		<b>Page No:</b> 7 of 10
<b>Doc No:</b> GQTableMark001g	<b>Rev No:</b> 007	<b>Compiled by:</b> HJ Burger
<b>Approved by:</b> Marketing Manager		<b>Effective date:</b> August 2018

Potential acute health effects

- Inhalation : No known significant effects or critical hazards
- Ingestion : No known significant effects or critical hazards
- Skin contact : No known significant effects or critical hazards
- Eye contact : No known significant effects or critical hazards

Symptoms related to the physical, chemical and toxicological characteristics

- Inhalation : No specific data
- Ingestion : No specific data
- Skin contact : No specific data
- Eye contact : No specific data

Delayed and immediate effects and chronic effects from short and long term exposure

- Short term exposure
- Potential immediate effects : Not available
- Potential delayed effects : Not available
- Long term exposure
- Potential immediate effects : Not available
- Potential delayed effects : Not available

Potential chronic health effects

- Conclusion/Summary : No available
- General : No known significant effects or critical hazards
- Carcinogenicity : No known significant effects or critical hazards
- Mutagenicity : No known significant effects or critical hazards
- Teratogenicity : No known significant effects or critical hazards
- Developmental effects : No known significant effects or critical hazards
- Fertility effects : No known significant effects or critical hazards
- Other information : When converted to Titanium Dioxide Pigment by downstream users, airborne particles may be generated. Titanium dioxide was classified as possible carcinogens, IARC 2B (based on animal studies, particle overload, however in human epidemiology studies all negative)

**SECTION 12: ECOLOGICAL INFORMATION**

**12.1 TOXICITY**

PRODUCT/INGREDIENT NAME	TEST	RESULT	SPECIES	EXPOSURE
UGI Sediment Compartment	OPPTS 850.1735 Whole Sediment Toxicity Invertebrates, Fresh water	NOEC > 100 000 ppm fresh water	Hyalella azteca	28 days
Terrestrial Compartment	OECD 208 Seedling Emergence and Seedling Growth Test	NOEC > 100 000 ppm NOEC > 100 000 ppm	Hordeum vulgare	20 days



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<b>Document Title:</b> Safety Data Sheet – Chloride Slag		<b>Page No:</b> 8 of 10
<b>Doc No:</b> GQTableMark001g	<b>Rev No:</b> 007	<b>Compiled by:</b> HJ Burger
<b>Approved by:</b> Marketing Manager		<b>Effective date:</b> August 2018

	OECD 208 Seedling Emergence and Seedling Growth Test	NOEC > 100 000 ppm	Lactuca sativa	28 days
	OECD 216 Soil Micro-organisms, Nitrogen Transformation Test	NOEC > 1000 ppm	Micro-organism – soil organisms	28 days
	OECD 232 Collembolan reproduction test in soil		Micro-organism – Folsomia candida	28 days
Aquatic Compartment	OECD 201 Alga, Growth Inhibition Test	Acute EC50>100mg/l Fresh water	Algae	72 hours
	OECD 202 Daphnia sp. Acute Immobilization Test and Reproduction Test	Acute EC50>100mg/l Acute EC50>100mg/l Fresh water	Daphnia	48 hours
	OECD 203 Fish, Acute Toxicity Test		Fish	96 hours
	OECD 209 Activated Sludge, Respiration Inhibition Test	Acute NOEC >112mg/l	Micro-organism	3 hours
	OECD 201 Alga, Growth Inhibition Test	Chronic EC50>1mg/l	Algae	28 days

Conclusion/Summary : Not classified

## 12.2 PERSISTENCE AND DEGRADABILITY

Conclusion/Summary : Not readily biodegradable

## 12.3 BIO-ACCUMULATIVE POTENTIAL

PRODUCT/INGREDIENT NAME	LogP <sub>ow</sub>	BCF	POTENTIAL	PRODUCT/INGREDIENT NAME
UGI	-	-	-	UGI

## 12.4 MOBILITY IN SOIL

Soil/water partition coefficient (K<sub>oc</sub>) : Not available

Mobility : Not available

## 12.5 RESULTS OF PBT AND vPvB ASSESSMENTS

PBT : Not applicable  
PBT specified

vPvB : Not applicable  
vPvB specified

## 12.6 AQUATIC TOXICITY

Organism uptake potential : Not readily. Not soluble at pH and temperature of natural seawater and fresh water

Toxicity to aquatic life : Non-toxic, inorganic material with no leaching of elements at pH and temperature of natural seawater and fresh water. Low risk (Refer to UN GHS Annex 9)

Radioactive hazard : Low risk. Classified as radioactive material in terms of IAEA guidelines



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<b>Document Title:</b> Safety Data Sheet – Chloride Slag		<b>Page No:</b> 9 of 10
<b>Doc No:</b> GQTableMark001g	<b>Rev No:</b> 007	<b>Compiled by:</b> HJ Burger
<b>Approved by:</b> Marketing Manager		<b>Effective date:</b> August 2018

Aquatic pollution potential : Low Risk. Inorganic, natural chemical components and easily dispersed by natural movement

**Footnote:**

As per definition, UN GHS Annex 9, the material is classified as a “difficult substance” to test. Reference to aquatic toxicity is limited to available scientific knowledge and specifically based references and hypothesis.

**SECTION 13: DISPOSAL CONSIDERATIONS**

Method of disposal : Recycle if possible. The generation of waste should be avoided or minimized whenever possible. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor

Hazardous waste : Within the present knowledge of the supplier, this product is not regarded as hazardous waste, as defined by the EU Directive 91/689/EEC

**SECTION 14: TRANSPORT INFORMATION**

	ADR/RID	AND/ADNR	IMDG	IATA
14.1 UN Number	Not regulated	Not regulated	Not regulated	Not regulated
14.2 UN Proper Shipping Name	-	-	-	-
14.3 Transport hazard class(es)	-	-	-	-
14.4 Packing Group	-	-	-	-
14.5 Environmental Hazards	No	No	No	No
14.6 Special Precautions for User	Not available	Not available	Not available	Not available
14.7 Additional Information	-	-	-	-

14.8 Transport in bulk according to Annex II of MARPOL 73/78 and The IBC code : Compliant with IMBSC Code

**SECTION 15: REGULATORY INFORMATION**

**15.1 SAFETY, HEALTH AND ENVIRONMENTAL REGULATIONS SPECIFIC FOR THE SUBSTANCE OR MIXTURE EU Regulation (EC) No. 1907/2006 (REACH)**

- Annex XIV – List of substances subject to authorization substances of very high concern : None of the components are listed

- Annex XVII – Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles : Not applicable

**Other EU Regulations**

- Europe Inventory : This material is listed

- Black List Chemicals : Not listed

- Priority List Chemicals : Not listed

- Integrated pollution prevention and control list (IPPC) – Air : Not listed

- Integrated pollution prevention and control list (IPPC) – Water : Not listed



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<b>Document Title:</b> Safety Data Sheet – Chloride Slag		<b>Page No:</b> 10 of 10
<b>Doc No:</b> GQTableMark001g	<b>Rev No:</b> 007	<b>Compiled by:</b> HJ Burger
<b>Approved by:</b> Marketing Manager		<b>Effective date:</b> August 2018

- International Regulations
- Chemical Weapons Convention List  
Schedule I Chemicals : Not listed
- Chemical Weapons Convention List  
Schedule II Chemicals : Not listed
- Chemical Weapons Convention List  
Schedule III Chemicals : Not listed

**15.2 Chemical Safety Assessment:** : Complete

#### SECTION 16: OTHER INFORMATION

\*Indicates information that has been changed from previously issued version.

Abbreviations and acronyms : ATE = Acute Toxicity Estimate  
CLP = Classification, Labeling and Packaging Regulation  
[Regulation (EC) No. 1272/2008]  
DNEL = Derived No Effect Level  
EUH statement = CLP – specific Hazard statement  
PNEC = Predicted No Effect Concentration  
RPN = Reach Registration Number

#### PROCEDURE TO DERIVE THE CLASSIFICATION ACCORDING TO REGULATION (EC) NO. 1272/2008 (CLP/GHS)

Classification	Justification
Not classified	

Full text of abbreviated H statements : Not applicable  
Full text of classifications (CLP/GHS) : Not applicable  
Full text of abbreviated R statements : Not applicable  
Full text of classifications (DSD/DPD) : Not applicable  
Date of printing : 7 August 2019  
Date of Issue/date of revision : August 2018  
Version : 7.0

#### Disclaimer

The information contained in this SDS is to the best of our knowledge accurate. Tronox Mineral Sands (Pty) Ltd, its employees, directors, agents, subsidiaries, affiliates or related companies shall not assume any liability of whatsoever cause (including consequential damages) for the accuracy or completeness of the information contained in this SDS. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with cautions. Although hazards are described herein, we cannot guarantee that these are the only hazards that exist.



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Issuing Date 03-Feb-2020

Revision date 18-July-2022

Revision Number 14

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

### 1.1. Product identifier

Product Name	Tronox Rutile Sand
EC No	215-282-2
CAS No.	1317-80-2
Synonyms	Titanium dioxide rutile

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

Recommended use	Industrial applications raw materials for the titanium dioxide pigment industry, titanium tetrachloride, titanium metal industry and welding rods.
Uses advised against	For industrial use only

### 1.3. Details of the supplier of the safety data sheet

#### Supplier

Tronox Mineral Sands (Pty) Ltd  
 River Falls Office Park Ground Floor  
 Wild Pear Building Doornkloof  
 Centurion, 0157, South Africa

For further information, please contact

E-mail address chemprodsteward@tronox.com

### 1.4. Emergency telephone number

Emergency Telephone 24 Hour Emergency Phone Number  
 CHEMTREC (International): +1 703 741 5970

## SECTION 2: Hazards identification

### 2.1. Classification of the substance or mixture

Not a dangerous substance or mixture according to the Globally Harmonized System (GHS).

### 2.2. Label elements

#### Hazard statements

Not applicable

### 2.3. Other hazards

The principal hazard is due to inhalation of dust. The normal grain size of rutile precludes it from being an inhalation hazard. Avoid the creation of dust during handling and processing.  
 With some products, certain processes (e.g. grinding, drying), airborne respirable crystalline silica (quartz) may be generated.

Prolonged and/or massive inhalation of respirable crystalline silica may cause lung fibrosis, commonly referred to as silicosis. Principal symptoms of silicosis are cough and breathlessness. Occupational exposure to respirable crystalline silica dust should be monitored and controlled.

## SECTION 3: Composition/information on ingredients

### 3.1 Substances

Not applicable

### 3.2 Mixtures

Chemical name	EC No	CAS No	Weight-%	Classification according to Regulation (EC) No. 1272/2008 [CLP]	REACH registration number
Titanium dioxide (rutile)	215-282-2	1317-80-2	89-94	No data available	No data available
Leucoxene	-	12173-81-8	4-7	No data available	No data available
Zirconium silicate	239-019-6	14940-68-2	<1	No data available	No data available
Ilmenite	235-828-3	12789-64-9	<1	No data available	No data available
Quartz	238-878-4	14808-60-7	0.5	STOT RE 2 (H373)	No data available

**Full text of H- and EUH-phrases: see section 16**

#### Additional information

This material is a naturally occurring radioactive material (NORM) and is considered a radioactive product (IAEA radioactive material if above 1Bq/g) however it is not considered a radioactive product for transportation purpose, limit of 10Bq/g for NORM. Some countries may use different limits; therefore, local regulations should be consulted for the latest requirements.

- Uranium: 37 – 85 ppm (0.5 – 1.0 Bq/g Uranium – 238)
- Thorium: 60 – 106 ppm (0.3 – 0.4 Bq/g Thorium - 232)
- Other daughter nuclides are in secular equilibrium

The typical gamma radiation dose rate on rutile bags is less than 1µSv/h (<0.1mRem/h), above the background. A person may work in dust concentrations of ≤10mg/m<sup>3</sup> for a full year without exceeding the maximum dose for a worker (1mSv/a / 0.1Rem/a).

This product does not contain candidate substances of very high concern at a concentration ≥0.1% (Regulation (EC) No. 1907/2006 (REACH), Article 59)

## SECTION 4: First aid measures

### 4.1. Description of first aid measures

<b>General advice</b>	No hazards which require special first aid measures.
<b>Inhalation</b>	Remove to fresh air.
<b>Eye contact</b>	Rinse thoroughly with plenty of water for at least 15 minutes, lifting lower and upper eyelids. Consult a physician.
<b>Skin contact</b>	Wash skin with soap and water.
<b>Ingestion</b>	Clean mouth with water and drink afterwards plenty of water.
<b>Self-protection of the first aider</b>	Use personal protective equipment as required.

**4.2. Most important symptoms and effects, both acute and delayed**

**Symptoms** Inhalation of dust in high concentration may cause irritation of respiratory system.

**4.3. Indication of any immediate medical attention and special treatment needed**

**Note to physicians** Treat symptomatically.

**SECTION 5: Firefighting measures****5.1. Extinguishing media**

**Suitable Extinguishing Media** Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

**5.2. Special hazards arising from the substance or mixture**

**Specific hazards arising from the chemical** Avoid generation of dust.

**Hazardous combustion products** Non-combustible.

**5.3. Advice for firefighters**

**Special protective equipment for fire-fighters** Protective equipment and precautions for firefighters.

**SECTION 6: Accidental release measures****6.1. Personal precautions, protective equipment and emergency procedures**

**Personal precautions** Use personal protective equipment as required.

**For emergency responders** Use personal protection recommended in Section 8.

**6.2. Environmental precautions**

**Environmental precautions** Do not flush into surface water or sanitary sewer system.

**6.3. Methods and material for containment and cleaning up**

**Methods for containment** Prevent further leakage or spillage if safe to do so.

**Methods for cleaning up** Take up mechanically, placing in appropriate containers for disposal.

**Prevention of secondary hazards** Clean contaminated objects and areas thoroughly observing environmental regulations.

**6.4. Reference to other sections**

**Reference to other sections** See section 8 for more information. See section 13 for more information.

**SECTION 7: Handling and storage****7.1. Precautions for safe handling**

**Advice on safe handling** Avoid contact with eyes. Avoid generation of dust. Use of safe work practices are recommended to avoid inhalation, eye or skin contact. Wash face, hands and any exposed skin thoroughly after handling.

**General hygiene considerations** Do not eat, drink or smoke when using this product. Handle in accordance with good industrial hygiene and safety practice. Regular cleaning of equipment, work area and clothing is recommended. Wash hands and face before breaks and immediately after handling the product. Take off contaminated clothing and wash before reuse.

### 7.2. Conditions for safe storage, including any incompatibilities

**Storage Conditions** Store in a cool, well ventilated area.

### 7.3. Specific end use(s)

**Risk Management Methods (RMM)** The information required is contained in this Safety Data Sheet.

## **SECTION 8: Exposure controls/personal protection**

### 8.1. Control parameters

#### Exposure Limits

Chemical name	ACGIH TLV	OSHA PEL	NIOSH
Quartz 14808-60-7	TWA: 0.025 mg/m <sup>3</sup> respirable particulate matter	TWA: 50 µg/m <sup>3</sup> (vacated) TWA: 0.1 mg/m <sup>3</sup> respirable dust : (250)/(%SiO <sub>2</sub> + 5) mppcf TWA respirable fraction : (10)/(%SiO <sub>2</sub> + 2) mg/m <sup>3</sup> TWA respirable fraction	IDLH: 50 mg/m <sup>3</sup> respirable dust TWA: 0.05 mg/m <sup>3</sup> respirable dust

#### Information on monitoring procedures

This product contains ingredients with exposure limits, and therefore personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.

### 8.2. Exposure controls

#### Engineering controls

Good general ventilation should be sufficient to control worker exposure to airborne contaminants. If user operations generate dust, fumes, gas, vapour or mist, use process enclosures, local exhaust ventilation (LEV) or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

#### Personal protective equipment

##### Eye/face protection

Safety glasses with side shields are recommended for medical or industrial exposures.

##### Hand protection

No special protective equipment required. Wash face, hands and any exposed skin thoroughly after handling.

##### Skin and body protection

No special protective equipment required. Wash contaminated clothing before reuse.

##### Respiratory protection

None under normal use conditions. When workers are facing concentrations above the exposure limit they must use appropriate certified respirators.

##### Recommended filter type:

Respiratory protection with a particle filter.

##### Thermal hazards

None under normal processing.

#### General hygiene considerations

Do not eat, drink or smoke when using this product. Handle in accordance with good industrial hygiene and safety practice. Regular cleaning of equipment, work area and clothing is recommended. Wash hands and face before breaks and immediately after

handling the product. Take off contaminated clothing and wash before reuse.

**Environmental exposure controls** Encourage the re-use of uncontaminated product. Use local exhaust ventilation (LEV) to prevent/reduce air emissions. Emissions trapped from LEV should be re-used when possible. Solid waste cannot be re-used should be disposed of according to the local laws and regulations.

## SECTION 9: Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

Physical state	Solid
Appearance	Powder
Color	red brown
Odor	Odorless
Odor threshold	Not applicable

<u>Property</u>	<u>Values</u>	<u>Remarks • Method</u>
pH		None known
pH (as aqueous solution)		No data available
Melting point / freezing point	1850 °C	Melting point / melting range
Boiling point / boiling range		No data available
Flash point		None known
Evaporation rate		None known
Flammability (solid, gas)		None known
Flammability Limit in Air		Not applicable
Upper flammability or explosive limits	Not applicable	
Lower flammability or explosive limits	Not applicable	
Vapor pressure		None known
Vapor density		None known
Relative density	4.2 g/cm <sup>3</sup>	(water = 1)
Water solubility	Insoluble in water	No information available
Solubility(ies)	Insoluble in: cold water, hot water, methanol, diethyl ether, n-octanol and acetone	No data available
Partition coefficient		None known
Autoignition temperature		None known
Decomposition temperature		No data available
Kinematic viscosity		Not applicable
Dynamic viscosity		Not applicable
Explosive properties	No information available	

### 9.2. Other information

Softening point	No information available
Molecular weight	Not applicable
VOC Content (%)	No information available d50: 105 µm

## SECTION 10: Stability and reactivity

### 10.1. Reactivity

Reactivity	Stable.
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### 10.2. Chemical stability

Stability	Stable under normal conditions.
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**Explosion data**

Sensitivity to mechanical impact None.

Sensitivity to static discharge None.

**10.3. Possibility of hazardous reactions**

Possibility of hazardous reactions None under normal processing.

**10.4. Conditions to avoid**

Conditions to avoid Dust formation.

**10.5. Incompatible materials**

Incompatible materials None known.

**10.6. Hazardous decomposition products**

Hazardous decomposition products None under normal use conditions.

**SECTION 11: Toxicological information****11.1. Information on toxicological effects****Information on likely routes of exposure**

<b>Product Information</b>	An inert substance with extremely low toxicity to humans and animals
<b>Inhalation</b>	Inhalation of dust in high concentration may cause irritation of respiratory system.
<b>Eye contact</b>	Inert foreign body hazard only.
<b>Skin contact</b>	No known effects under normal use conditions.
<b>Ingestion</b>	Not an expected route of exposure.

**Symptoms related to the physical, chemical and toxicological characteristics**

Symptoms Inhalation in high concentration may cause irritation of respiratory system.

**Numerical measures of toxicity**

Acute toxicity An inert substance with extremely low toxicity to humans and animals

**Delayed and immediate effects as well as chronic effects from short and long-term exposure**

<b>Skin corrosion/irritation</b>	Based on available data, the classification criteria are not met.
<b>Serious eye damage/eye irritation</b>	Based on available data, the classification criteria are not met.
<b>Respiratory or skin sensitization</b>	Based on available data, the classification criteria are not met.
<b>Germ cell mutagenicity</b>	Not mutagenic in AMES Test.
<b>Carcinogenicity</b>	Based on available data, the classification criteria are not met.
<b>Reproductive toxicity</b>	Based on available data, the classification criteria are not met.
<b>Developmental toxicity</b>	None known.

<b>Teratogenicity</b>	None known.
<b>STOT - single exposure</b>	Based on available data, the classification criteria are not met.
<b>STOT - repeated exposure</b>	Based on available data, the classification criteria are not met.
<b>Other adverse effects</b>	<p>Prolonged and/or massive exposure to respirable crystalline silica-containing dust may cause silicosis, a nodular pulmonary fibrosis caused by deposition in the lungs of fine respirable particles of crystalline silica.</p> <p>In 1997, IARC (the International Agency for Research on Cancer) concluded that crystalline silica inhaled from occupational sources can cause lung cancer in humans. However, it pointed out that not all industrial circumstances, nor all crystalline silica types, were to be incriminated. (IARC Monographs on the evaluation of the carcinogenic risks of chemicals to humans, Silica, silicates dust and organic fibres, 1997, Vol. 68, IARC, Lyon, France.).</p> <p>In June 2003, EU SCOEL (the EU Scientific Committee on Occupational Exposure Limits) concluded that the main effect in humans of the inhalation of respirable crystalline silica dust is silicosis. "There is sufficient information to conclude that the relative risk of lung cancer is increased in persons with silicosis (and, apparently, not in employees without silicosis exposed to silica dust in quarries and in the ceramic industry). Therefore, preventing the onset of silicosis will also reduce the cancer risk "(SCOEL SUM Doc 94-final, June 2003). There is a body of evidence supporting the fact that increased cancer risk would be limited to people already suffering from silicosis. Worker protection against silicosis should be assured by respecting the existing regulatory occupational exposure limits and implementing additional risk management measures where required (see section 16 below).</p>
<b>Aspiration hazard</b>	Not applicable.

## SECTION 12: Ecological information

### 12.1. Toxicity

<b>Ecotoxicity</b>	No known significant effects or critical hazards.
<b>Unknown aquatic toxicity</b>	Contains 0 % of components with unknown hazards to the aquatic environment.

### 12.2. Persistence and degradability

<b>Persistence and degradability</b>	Not readily biodegradable.
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### 12.3. Bioaccumulative potential

<b>Bioaccumulation</b>	Not applicable.
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### 12.4. Mobility in soil

<b>Mobility in soil</b>	Not applicable.
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### 12.5. Results of PBT and vPvB assessment

Chemical name	PBT and vPvB assessment
Titanium dioxide (rutile)	PBT assessment does not apply

### 12.6. Other adverse effects

<b>Other adverse effects</b>	None known.
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**SECTION 13: Disposal considerations****13.1. Waste treatment methods**

<b>Waste from residues/unused products</b>	Recover or recycle if possible. The generation of waste should be avoided or minimized whenever possible. Dispose of surplus and non-recyclable products to an approved landfill site in accordance with applicable local regulations.
<b>Contaminated packaging</b>	Do not reuse empty containers.
<b>Waste codes / waste designations according to EWC / AVV</b>	Waste codes should be assigned by the user based on the application for which the product was used.

**SECTION 14: Transport information**

<b><u>IMDG</u></b>	Not regulated
<b><u>RID</u></b>	Not regulated
<b><u>ADR</u></b>	Not regulated
<b><u>IATA</u></b>	Not regulated

**SECTION 15: Regulatory information****15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture****Authorizations and/or restrictions on use:**

This product does not contain substances subject to authorization (Regulation (EC) No. 1907/2006 (REACH), Annex XIV) This product does not contain substances subject to restriction (Regulation (EC) No. 1907/2006 (REACH), Annex XVII)

**Persistent Organic Pollutants**

Not applicable

**Ozone-depleting substances (ODS) regulation (EC) 1005/2009** Not applicable

**15.2. Chemical safety assessment**

**Chemical Safety Report** This is EU specific and not needed elsewhere. Substance is not classified therefore no Chemical Safety Assessment has been carried out for this product by the supplier.

**SECTION 16: Other information****Key or legend to abbreviations and acronyms used in the safety data sheet****Legend**

PBT: Persistent, Bioaccumulative, and Toxic (PBT) Chemicals

vPvB: Very Persistent and very Bioaccumulative (vPvB) Chemicals

**Legend Section 8: Exposure controls/personal protection**

TWA	TWA (time-weighted average)	STEL	STEL (Short Term Exposure Limit)
Ceiling	Maximum limit value	*	Skin designation

**Classification procedure**

Expert judgment and weight of evidence determination

**Key literature references and sources for data used to compile the SDS**

Agency for Toxic Substances and Disease Registry (ATSDR)  
U.S. Environmental Protection Agency ChemView Database  
European Food Safety Authority (EFSA)  
EPA (Environmental Protection Agency)  
Acute Exposure Guideline Level(s) (AEGL(s))  
U.S. Environmental Protection Agency Federal Insecticide, Fungicide, and Rodenticide Act  
U.S. Environmental Protection Agency High Production Volume Chemicals  
Food Research Journal  
Hazardous Substance Database  
International Uniform Chemical Information Database (IUCLID)  
Japan GHS Classification  
Australia National Industrial Chemicals Notification and Assessment Scheme (NICNAS)  
NIOSH (National Institute for Occupational Safety and Health)  
National Library of Medicine's ChemID Plus (NLM CIP)  
National Library of Medicine's PubMed database (NLM PUBMED)  
National Toxicology Program (NTP)  
New Zealand's Chemical Classification and Information Database (CCID)  
Organization for Economic Co-operation and Development Environment, Health, and Safety Publications  
Organization for Economic Co-operation and Development High Production Volume Chemicals Program  
Organization for Economic Co-operation and Development Screening Information Data Set  
World Health Organization

<b>Prepared By</b>	Product Stewardship
<b>Issuing Date</b>	03-Feb-2020
<b>Revision date</b>	18-July-2022
<b>Reason for revision</b>	Template version; Emergency telephone number updated
<b>Restrictions on use</b>	This product is not intended for consumption, cosmetic, pharmaceutical or medical end use. Tronox will not knowingly sell product for use into these applications.
<b>Training Advice</b>	This document contains important information to ensure the safe storage, handling and use of this product. It is the responsibility of your organization to ensure that the information contained within this document is communicated to the end user and that all necessary training to enable the product to be used correctly has been given.

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**End of Safety Data Sheet**