



# MATERIAL SAFETY DATA SHEET

## 1. Product and Company Identification

<b>Material name</b>	TRONOX® Iron Oxide
<b>Version #</b>	01
<b>Revision date</b>	11-24-2009
<b>Product Code</b>	Iron oxide
<b>MSDS Number</b>	B-5031
<b>Product use</b>	Cement Manufacture, Slagging, Coal Cleaning, Oil Well Drilling, Low grade iron ore
<b>Manufacturer information</b>	Tronox LLC 3301 NW 150th Street Oklahoma City, OK 73134 US ChemProdSteward@tronox.com 1-405-775-5000 (24-hours)
<b>Emergency</b>	CHEMTREC 1-800-424-9300

## 2. Hazards Identification

<b>Physical state</b>	Solid
<b>Appearance</b>	Pellets. Powder.
<b>Emergency overview</b>	CAUTION  May cause eye, skin and respiratory tract irritation.
<b>OSHA regulatory status</b>	This product is considered hazardous under 29 CFR 1910.1200 (Hazard Communication).
<b>Potential health effects</b>	
<b>Routes of exposure</b>	Eye contact. Ingestion. Inhalation. Skin contact.
<b>Eyes</b>	Contact with eyes may cause irritation.
<b>Skin</b>	Dust or powder may irritate the skin. Skin irritation occurs on contact with moist or wet skin.
<b>Inhalation</b>	Dust may irritate throat and respiratory system and cause coughing. Inhalation of manganese oxide dust/fumes may cause metal fume fever. The symptoms are shivering, fever, malaise and muscular pain.
<b>Ingestion</b>	May irritate and cause stomach pain, vomiting, diarrhea and nausea.
<b>Target organs</b>	Eyes. Central nervous system. Lungs. Respiratory system. Skin.
<b>Chronic effects</b>	Chronic inhalation of high concentrations of iron oxide fumes or dust may lead to benign pneumoconiosis (siderosis). Chronic exposure to breathing low levels of manganese dust or fume over a long period of time can result in "manganism," a disease of the central nervous system similar to Parkinson's Disease, gait impairment, muscle spasms and behavioral changes. Frequent inhalation of fume/dust over a long period of time may increase the risk of developing lung diseases although epidemiological studies among titanium dioxide workers could not demonstrate this.
<b>Signs and symptoms</b>	Coughing. Irritation of eyes and mucous membranes. May cause irritation through mechanical abrasion.
<b>Potential environmental effects</b>	The product components are not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

## 3. Composition / Information on Ingredients

Components	CAS #	Percent
Iron oxide	1309-37-1	80-90
Hydrochloric acid	7647-01-0	1-10
Aluminium oxide	1344-28-1	2-5
Magnesium oxide	1309-48-4	2-5
Manganese(III)oxide	1317-34-6	2-5

Inorganic chlorides		1.5-5
Titanium dioxide	13463-67-7	1-3
Radium compounds		15-30 pCi/g

**Composition comments** All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

#### 4. First Aid Measures

##### First aid procedures

**Eye contact** Dust in the eyes: Do not rub eyes. Remove contact lenses, if present and easy to do. Get medical attention if irritation develops or persists.

**Skin contact** Flush skin thoroughly with water. Get medical attention if irritation develops and persists.

**Inhalation** Move to fresh air. Get medical attention if any discomfort continues.

**Ingestion** Rinse mouth thoroughly. Do not induce vomiting without advice from poison control center. Never give anything by mouth to an unconscious person. If ingestion of a large amount occurs, call a poison control center immediately.

**Notes to physician** Treat symptomatically.

**General advice** Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

#### 5. Fire Fighting Measures

**Flammable properties** The product is not flammable.

##### Extinguishing media

**Suitable extinguishing media** Use fire-extinguishing media appropriate for surrounding materials.

**Unsuitable extinguishing media** None.

##### Protection of firefighters

**Protective equipment and precautions for firefighters** Firefighters should wear full protective clothing including self contained breathing apparatus. Selection of respiratory protection for fire fighting: follow the general fire precautions indicated in the workplace.

**Specific methods** Move container from fire area if it can be done without risk.

**Hazardous combustion products** Metal oxides.

#### 6. Accidental Release Measures

**Personal precautions** Avoid inhalation of dust and contact with skin and eyes. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Use Personal Protective Equipment recommended in Section 8 of the MSDS.

**Environmental precautions** Prevent further leakage or spillage if safe to do so. Do not contaminate water.

**Methods for containment** Stop leak if you can do so without risk.

**Methods for cleaning up** Avoid dust formation. Collect powder using special dust vacuum cleaner with particle filter or carefully sweep into closed container. For waste disposal, see Section 13 of the MSDS.

**Other information** Clean up in accordance with all applicable regulations.

#### 7. Handling and Storage

**Handling** Avoid dust formation. Avoid inhalation of dust and contact with skin and eyes. Use only with adequate ventilation. Use Personal Protective Equipment recommended in section 8 of the MSDS. Wash thoroughly after handling.

**Storage** Store in tightly closed original container in a dry and cool place. Store away from incompatible materials.

## 8. Exposure Controls / Personal Protection

### Occupational exposure limits

#### ACGIH

Components	Type	Value	Form
Aluminium oxide (1344-28-1)	TWA	1 mg/m <sup>3</sup>	Respirable fraction.
Hydrochloric acid (7647-01-0)	Ceiling	2 ppm	
Iron oxide (1309-37-1)	TWA	5 mg/m <sup>3</sup>	Respirable fraction.
Magnesium oxide (1309-48-4)	TWA	10 mg/m <sup>3</sup>	Inhalable fraction.
Manganese(III)oxide (1317-34-6)	TWA	0,2 mg/m <sup>3</sup>	
Titanium dioxide (13463-67-7)	TWA	10 mg/m <sup>3</sup>	

#### U.S. - OSHA

Components	Type	Value	Form
Aluminium oxide (1344-28-1)	PEL	15 mg/m <sup>3</sup>	Total dust.
		5 mg/m <sup>3</sup>	Respirable fraction.
	TWA	10 mg/m <sup>3</sup>	Total dust.
Hydrochloric acid (7647-01-0)		5 mg/m <sup>3</sup>	Respirable fraction.
	Ceiling	7 mg/m <sup>3</sup>	
Iron oxide (1309-37-1)		5 ppm	
	PEL	10 mg/m <sup>3</sup>	Fume.
Magnesium oxide (1309-48-4)	TWA	10 mg/m <sup>3</sup>	Fume.
	PEL	15 mg/m <sup>3</sup>	Total particulate.
Manganese(III)oxide (1317-34-6)	TWA	10 mg/m <sup>3</sup>	Total particulate.
	Ceiling	5 mg/m <sup>3</sup>	
Titanium dioxide (13463-67-7)	PEL	15 mg/m <sup>3</sup>	Total dust.
	TWA	10 mg/m <sup>3</sup>	Total dust.

#### Canada - Alberta

Components	Type	Value	Form
Aluminium oxide (1344-28-1)	TWA	10 mg/m <sup>3</sup>	
Hydrochloric acid (7647-01-0)	Ceiling	7,5 mg/m <sup>3</sup>	
		5 ppm	
Iron oxide (1309-37-1)	TWA	5 mg/m <sup>3</sup>	Dust and fume.
		10 mg/m <sup>3</sup>	
Magnesium oxide (1309-48-4)	TWA	10 mg/m <sup>3</sup>	Fume.
Manganese(III)oxide (1317-34-6)	TWA	1 mg/m <sup>3</sup>	
Titanium dioxide (13463-67-7)	TWA	10 mg/m <sup>3</sup>	

#### Canada - British Columbia

Components	Type	Value	Form
Aluminium oxide (1344-28-1)	TWA	10 mg/m <sup>3</sup>	Total dust.
		3 mg/m <sup>3</sup>	Respirable fraction.
Hydrochloric acid (7647-01-0)	Ceiling	2 ppm	
Iron oxide (1309-37-1)	TWA	10 mg/m <sup>3</sup>	Fume.
		5 mg/m <sup>3</sup>	Fume.
		10 mg/m <sup>3</sup>	Total dust.
		3 mg/m <sup>3</sup>	Respirable fraction.
Magnesium oxide (1309-48-4)	STEL	5 mg/m <sup>3</sup>	Dust.
		10 mg/m <sup>3</sup>	Respirable dust and/or fume.
			Respirable dust and/or fume.
		3 mg/m <sup>3</sup>	Respirable dust and/or fume.
			Inhalable fume.
Manganese(III)oxide (1317-34-6)	TWA	10 mg/m <sup>3</sup>	
Titanium dioxide (13463-67-7)	TWA	0,2 mg/m <sup>3</sup>	
		10 mg/m <sup>3</sup>	Total dust.
		3 mg/m <sup>3</sup>	Respirable fraction.

**Canada - Ontario**

Components	Type	Value	Form
Aluminium oxide (1344-28-1)	TWA	10 mg/m3 10 mg/m3	Total dust. Dust.
Hydrochloric acid (7647-01-0)	Ceiling	2 ppm	
Iron oxide (1309-37-1)	TWA	5 mg/m3	Respirable.
Magnesium oxide (1309-48-4)	TWA	10 mg/m3	Inhalable
Manganese(III)oxide (1317-34-6)	TWA	0,2 mg/m3	
Titanium dioxide (13463-67-7)	TWA	10 mg/m3	Total dust.

**Canada - Quebec**

Components	Type	Value	Form
Aluminium oxide (1344-28-1)	TWA	10 mg/m3	Total dust.
Hydrochloric acid (7647-01-0)	Ceiling	7,5 mg/m3 5 ppm	
Iron oxide (1309-37-1)	TWA	10 mg/m3 5 mg/m3	Total dust. Dust and fume.
Magnesium oxide (1309-48-4)	TWA	10 mg/m3	Fume.
Manganese(III)oxide (1317-34-6)	TWA	5 mg/m3	Dust.
Titanium dioxide (13463-67-7)	TWA	10 mg/m3	Total dust.

**Mexico**

Components	Type	Value	Form
Aluminium oxide (1344-28-1)	TWA	10 mg/m3	
Hydrochloric acid (7647-01-0)	Ceiling	7 mg/m3 5 ppm	
Iron oxide (1309-37-1)	STEL TWA	10 mg/m3 5 mg/m3	
Magnesium oxide (1309-48-4)	TWA	10 mg/m3	Fume.
Manganese(III)oxide (1317-34-6)	TWA	0,2 mg/m3	
Titanium dioxide (13463-67-7)	STEL TWA	20 mg/m3 10 mg/m3	

**Engineering controls** Ventilate as needed to control airborne dust. Provide adequate ventilation. Observe Occupational Exposure Limits and minimize the risk of inhalation of dust.

**Personal protective equipment**

<b>Eye / face protection</b>	Wear dust-resistant safety goggles where there is danger of eye contact.
<b>Skin protection</b>	Protective clothing is not required under normal conditions. Wear suitable gloves.
<b>Respiratory protection</b>	When engineering controls are not sufficient to lower exposure levels below the applicable exposure limit, use a NIOSH approved respirator for dusts. A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements must be followed whenever work place conditions warrant a respirator's use. Seek advice from local supervisor.
<b>General hygiene considerations</b>	Do not breathe dust. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

**9. Physical & Chemical Properties**

<b>Appearance</b>	Pellets. Powder.
<b>Color</b>	Brown/black.
<b>Odor</b>	Odorless.
<b>Odor threshold</b>	Not available.
<b>Physical state</b>	Solid
<b>Form</b>	Solid.
<b>pH</b>	4 (10% slurry)
<b>Melting point</b>	2800.4 °F (1538 °C) Decomposes.
<b>Freezing point</b>	Not available.
<b>Boiling point</b>	Not available.
<b>Flash point</b>	Not available.

Evaporation rate	Not available.
Flammability	Not available.
Flammability limits in air, upper, % by volume	Not available.
Flammability limits in air, lower, % by volume	Not available.
Vapor pressure	Not available.
Vapor density	Not available.
Specific gravity	4.29
Solubility (water)	Insoluble.
Partition coefficient (n-octanol/water)	Not available
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Bulk density	25 - 150 lb/ft3

## 10. Chemical Stability & Reactivity Information

Chemical stability	Stable.
Conditions to avoid	Contact with incompatible materials.
Incompatible materials	Aluminum powder. Calcium hypochlorite. Hydrazine. Ethylene Oxide. Calcium carbide. Strong acids.
Hazardous decomposition products	No hazardous decomposition products are known.
Possibility of hazardous reactions	Hazardous polymerization does not occur.

## 11. Toxicological Information

### Toxicological data

#### Components

Hydrochloric acid (7647-01-0)

#### Test Results

Acute Inhalation LC50 Rat: 3124 mg/l 1 Hours

Acute Oral LD50 Rabbit: 900 mg/kg

<b>Acute effects</b>	May cause eye, skin and respiratory tract irritation. Inhalation of manganese oxide dust/fumes may cause metal fume fever. The symptoms are shivering, fever, malaise and muscular pain.
<b>Local effects</b>	Dusts may irritate the respiratory tract, skin and eyes.
<b>Sensitization</b>	Not a skin sensitizer.
<b>Chronic effects</b>	Chronic inhalation of high concentrations of iron oxide fumes or dust may lead to benign pneumoconiosis (siderosis). Chronic exposure to breathing low levels of manganese dust or fume over a long period of time can result in "manganism," a disease of the central nervous system similar to Parkinson's Disease, gait impairment, muscle spasms and behavioral changes.
<b>Carcinogenicity</b>	IARC has classified TIO2 as 2B Possibly carcinogenic to humans. However, the only evidence of carcinogenicity is in rodents exposed to very high concentrations. Two major epidemiology studies among titanium dioxide workers in the US and in EUROPE could not demonstrated an elevated lung cancer risk.  Boffetta et. al. Mortality among workers employed in the titanium dioxide production industry in Europe. Cancer Causes Control. 2004 Sep;15(7):697-706. Fryzek et. al. A cohort mortality study among titanium dioxide manufacturing workers in the United States. J Occup Environ Med. 2003 Apr;45(4):400-9. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. IARC Monographs, Volume 93 (Summary)

#### ACGIH Carcinogens

Aluminium oxide (CAS 1344-28-1)	A4 Not classifiable as a human carcinogen.
Hydrochloric acid (CAS 7647-01-0)	A4 Not classifiable as a human carcinogen.
Iron oxide (CAS 1309-37-1)	A4 Not classifiable as a human carcinogen.
Magnesium oxide (CAS 1309-48-4)	A4 Not classifiable as a human carcinogen.
Titanium dioxide (CAS 13463-67-7)	A4 Not classifiable as a human carcinogen.

#### IARC Monographs. Overall Evaluation of Carcinogenicity

Hydrochloric acid (CAS 7647-01-0)	3 Not classifiable as to carcinogenicity to humans.
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Iron oxide (CAS 1309-37-1)  
Titanium dioxide (CAS 13463-67-7)

3 Not classifiable as to carcinogenicity to humans.  
2B Possibly carcinogenic to humans.

<b>Epidemiology</b>	No epidemiological data is available for this product.
<b>Mutagenicity</b>	This product is not reported to cause mutagenic effects in humans.
<b>Neurological effects</b>	No data available for this product.
<b>Reproductive effects</b>	Knowledge about reproductive effects is incomplete.
<b>Teratogenicity</b>	Not available.
<b>Further information</b>	No other specific acute or chronic health impact noted.

## 12. Ecological Information

<b>Ecotoxicity</b>	The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.
<b>Environmental effects</b>	An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
<b>Persistence and degradability</b>	The degradability of the product has not been stated.
<b>Bioaccumulation / Accumulation</b>	Bioaccumulation is unlikely to be significant because of the low water solubility of this product.
<b>Partition coefficient (n-octanol/water)</b>	Not available
<b>Mobility in environmental media</b>	The product is insoluble in water and will sediment in water systems.

## 13. Disposal Considerations

<b>Waste codes</b>	Not regulated.
<b>Disposal instructions</b>	Dispose of this material and its container at hazardous or special waste collection point.
<b>Waste from residues / unused products</b>	Dispose of in accordance with local regulations.
<b>Contaminated packaging</b>	Since emptied containers may retain product residue, follow label warnings even after container is emptied.

## 14. Transport Information

### DOT

Not regulated as dangerous goods.

### IATA

Not regulated as dangerous goods.

### IMDG

Not regulated as dangerous goods.

### TDG

Not regulated as dangerous goods.

## 15. Regulatory Information

<b>US federal regulations</b>	This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200. CERCLA/SARA Hazardous Substances - Not applicable.
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Regarding radium, numerous states have adopted regulations addressing naturally occurring radioactive material (NORM). 5 pCi/g total radium is a criterion used by many states as a threshold above which the material becomes licensable as NORM. 27 pCi/g total radium is the criterion established by the International Atomic Energy Agency (IAEA) as a threshold above which a material becomes licensable as NORM.

### US EPCRA (SARA Title III) Section 302 - Extremely Hazardous Spill: Reportable quantity

Hydrochloric acid (CAS 7647-01-0) 5000 LBS

### US EPCRA (SARA Title III) Section 302 - Extremely Hazardous Substance: Threshold Planning Quantity

Hydrochloric acid (CAS 7647-01-0) 500 LBS

### US EPCRA (SARA Title III) Section 313 - Toxic Chemical: De minimis concentration

Aluminium oxide (CAS 1344-28-1) 1.0 %  
Hydrochloric acid (CAS 7647-01-0) 1.0 %  
Manganese(III)oxide (CAS 1317-34-6) 1.0 % N450

**US EPCRA (SARA Title III) Section 313 - Toxic Chemical: Listed substance**

Aluminium oxide (CAS 1344-28-1)	Listed.
Hydrochloric acid (CAS 7647-01-0)	Listed.
Manganese(III)oxide (CAS 1317-34-6)	N450 Listed.

**CERCLA (Superfund) reportable quantity (lbs)**

Hydrochloric acid 5000

**Superfund Amendments and Reauthorization Act of 1986 (SARA)**

<b>Hazard categories</b>	Immediate Hazard - Yes
	Delayed Hazard - Yes
	Fire Hazard - No
	Pressure Hazard - No
	Reactivity Hazard - No

<b>Section 302 extremely hazardous substance</b>	No
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<b>Section 311 hazardous chemical</b>	Yes
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<b>Drug Enforcement Agency (DEA)</b>	Not controlled
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<b>WHMIS status</b>	Controlled
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<b>WHMIS classification</b>	D2A - Other Toxic Effects-VERY TOXIC
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**WHMIS labeling****Inventory status**

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	No
Canada	Domestic Substances List (DSL)	No
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	No
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	No
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	No
New Zealand	New Zealand Inventory	No
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	No
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	No

\*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)

**State regulations**

This product does not contain a chemical known to the State of California to cause cancer, birth defects or other reproductive harm.

**US - California Hazardous Substances (Director's): Listed substance**

Aluminium oxide (CAS 1344-28-1)	Listed.
Hydrochloric acid (CAS 7647-01-0)	Listed.
Iron oxide (CAS 1309-37-1)	Listed.
Magnesium oxide (CAS 1309-48-4)	Listed.
Manganese(III)oxide (CAS 1317-34-6)	Listed.

**US - Massachusetts RTK - Substance: Listed substance**

Aluminium oxide (CAS 1344-28-1)	Listed.
Hydrochloric acid (CAS 7647-01-0)	Listed.
Iron oxide (CAS 1309-37-1)	Listed.
Magnesium oxide (CAS 1309-48-4)	Listed.
Titanium dioxide (CAS 13463-67-7)	Listed.

**US - New Jersey Community RTK (EHS Survey): Reportable threshold**

Aluminium oxide (CAS 1344-28-1)	500 LBS
Hydrochloric acid (CAS 7647-01-0)	500 LBS

Manganese(III)oxide (CAS 1317-34-6) 500 LBS

**US - New Jersey RTK - Substances: Listed substance**

Aluminium oxide (CAS 1344-28-1) Listed.

Hydrochloric acid (CAS 7647-01-0) Listed.

Iron oxide (CAS 1309-37-1) Listed.

Magnesium oxide (CAS 1309-48-4) Listed.

Manganese(III)oxide (CAS 1317-34-6) Listed.

Titanium dioxide (CAS 13463-67-7) Listed.

**US - Pennsylvania RTK - Hazardous Substances: Listed substance**

Aluminium oxide (CAS 1344-28-1) Listed.

Hydrochloric acid (CAS 7647-01-0) Listed.

Iron oxide (CAS 1309-37-1) Listed.

Magnesium oxide (CAS 1309-48-4) Listed.

Titanium dioxide (CAS 13463-67-7) Listed.

## 16. Other Information

**Further information**

HMIS® is a registered trade and service mark of the NPCA.

**HMIS® ratings**

Health: 1\*  
Flammability: 0  
Physical hazard: 1  
Personal protection: X

**NFPA ratings**

Health: 1  
Flammability: 0  
Instability: 1

**Disclaimer**

The information in the sheet was written based on the best knowledge and experience currently available.

**Issue date**

11-24-2009