MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

Material name	**7018 and 7014 MILD STEEL ELECTRODES**
Version #	01
Issue date	25-March-2014
Revision date	-
Supersedes date	-
CAS #	Mixture
Product code	Coated carbon steel alloys
Product use	Carbon Steel Welding
Manufacturer information	
Manufacturer/Supplier	Harris Products Group 4501 Quality Place Mason, Ohio 45040 US custservmason@jwharris.com
Telephone number	513-754-2000
Emergency Telephone Numbers	1-888-609-1762 (US, Canada, Mexico only) Please quote 333988

2. Hazards Identification

Physical state	Solid.
Appearance	Coated metal rods.
Emergency overview	WARNING May cause eye, skin and respiratory tract irritation. Toxic: danger of serious damage to health by prolonged exposure through inhalation.
OSHA regulatory status	This product is considered hazardous under 29 CFR 1910.1200 (Hazard Communication).
Potential health effects	
Routes of exposure	Inhalation. Skin contact. Eye contact.
Eyes	Fumes from heated material may cause eye irritation. Dust may irritate the eyes. Exposure to hot material may cause thermal burns.
Skin	Exposure to hot material may cause thermal burns. Dust may irritate skin.
Inhalation	Inhalation of fumes may cause a flu-like illness called metal fume fever. Inhalation of dusts may cause respiratory irritation.
Ingestion	Ingestion is not likely to be a primary route of occupational exposure.
Target organs	Respiratory system. Eyes. Skin. Central nervous system.
Chronic effects	Chronic inhalation of fumes or dust may cause irritation or other respiratory conditions (e.g., bronchitis). May cause lung damage. Prolonged overexposure to fluorides may increase fluoride content of bones and teeth, and may result in fluorosis, and brittleness of bones. Absorbed fluoride can cause metabolic imbalances with irregular heartbeat, nausea, dizziness, vomiting and seizures. Chronic inhalation of high concentrations of iron oxide fumes or dust may lead to benign pneumoconiosis (siderosis). Overexposure to manganese fumes may affect the brain and central nervous system, resulting in poor coordination, difficulty speaking, and arm or leg tremor. This condition can be irreversible. Titanium dioxide is listed on the IARC (International Agency for Research on Cancer) as a Group 2B carcinogen (possibly carcinogenic to humans based on animal studies). However, due to the form of the product, risk of occupational exposure is expected to be limited. Refer to Section 11 Toxicological Information for more details.

Signs and symptoms Contact may cause irritation and redness. Dust may irritate respiratory system. Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting. Typical metal fume fever begins four to twelve hours after sufficient exposure to freshly formed fumes. The first symptoms are a metallic taste, dryness and irritation of the throat. Cough and shortness of breath may occur along with headache, fatigue, nausea, vomiting, muscle and joint pain, fever and chills. The syndrome runs its course in 24-48 hours.

Potential environmental effects Alloys in massive forms present a limited hazard for the environment.

3. Composition / Information on Ingredients

Components	CAS #	Percent
Calcium carbonate	1317-65-3	15
Calcium Fluoride	7789-75-5	10
Kaolin	1332-58-7	10
Titanium dioxide	13463-67-7	1 - 15
Cellulose	65996-61-4	2.5 - 10
Aluminum oxide	1344-28-1	5
Sodium silicate	1344-09-8	5
Manganese	7439-96-5	2
Silicon	7440-21-3	1.5
Molybdenum	7439-98-7	1
Phosphorus	7723-14-0	1
Sulfur	7704-34-9	1
Vanadium	7440-62-2	1
Iron oxide	1309-37-1	0.5
Zinc oxide	1314-13-2	0.5
Iron	7439-89-6	Balance

4. First Aid Measures

First aid procedures

Eye contact Rinse immediately with plenty of water for at least 15 minutes. Remove any contact lenses. Get medical attention if irritation develops or persists.

Skin contact Remove contaminated clothes and rinse skin thoroughly with water for at least 15 minutes. Get medical attention if irritation develops and persists.

Inhalation Remove person from contaminated area to fresh air. Apply artificial respiration if needed. Call a physician if symptoms develop or persist.

Ingestion Do NOT induce vomiting. Immediately rinse mouth and drink a cupful of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Notes to physician Treat symptomatically. Symptoms may be delayed.

General advice Show this safety data sheet to the doctor in attendance.

5. Fire Fighting Measures

Flammable properties Solid metal is not flammable; however, finely divided metallic dust or powder may form an explosive mixture with air. Do not use water on molten metal: Explosion hazard could result.

Extinguishing media

Suitable extinguishing media Extinguish with foam, carbon dioxide or dry powder.

Unsuitable extinguishing media Do not use water or halogenated extinguishing media.

Protection of firefighters

Specific hazards arising from the chemical Fire or high temperatures create: Metal oxides.

Fire fighting equipment/instructions Self-contained breathing apparatus and full protective clothing must be worn in case of fire. Move containers from fire area if you can do it without risk.

6. Accidental Release Measures

Personal precautions Keep unnecessary personnel away. Avoid inhalation of dust from the spilled material. Wear protective clothing as described in Section 8 of this MSDS. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.

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. Local authorities should be advised if significant spillages cannot be contained.

Methods for cleaning up Collect for salvage or disposal. Put material in suitable, covered, labeled containers. Avoid the generation of dusts during clean-up. For waste disposal, see Section 13 of the MSDS.

Other information Clean up in accordance with all applicable regulations.

7. Handling and Storage

Handling Follow the recommendations in ANSI Z49.1, Safety in welding and cutting (ANSI=American National Standard Institute). Avoid inhalation of dust and fumes. Use process enclosures, local exhaust ventilation, or other engineering controls to control sources of dust and fumes. Keep formation of airborne dusts to a minimum. Avoid contact with skin and eyes. Wear appropriate personal protective equipment (See Section 8). Do not eat, drink or smoke when using the product. Wash thoroughly after handling. Avoid release to the environment.

Storage Store in tightly closed original container in a dry, cool and well-ventilated place. Store in a closed container away from incompatible materials. Keep away from food, drink and animal feedingstuffs.

8. Exposure Controls / Personal Protection

Occupational exposure limits

US. ACGIH Threshold Limit Values

Components	Type	Value	Form
Aluminum oxide (CAS 1344-28-1)	TWA	1 mg/m3	Respirable fraction.
Fluorides, as F (CAS 16984-48-8)	TWA	2.5 mg/m3	
Iron oxide (CAS 1309-37-1)	TWA	5 mg/m3	Respirable fraction.
Kaolin (CAS 1332-58-7)	TWA	2 mg/m3	Respirable fraction.
Manganese (CAS 7439-96-5)	TWA	0.1 mg/m3	Inhalable fraction.
		0.02 mg/m3	Respirable fraction.
Molybdenum (CAS 7439-98-7)	TWA	3 mg/m3	Respirable fraction.
		10 mg/m3	Inhalable fraction.
Phosphorus (CAS 7723-14-0)	TWA	0.1 mg/m3	
Titanium dioxide (CAS 13463-67-7)	TWA	10 mg/m3	
Zinc oxide (CAS 1314-13-2)	STEL	10 mg/m3	Respirable fraction.
	TWA	2 mg/m3	Respirable fraction.

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value	Form
Aluminum oxide (CAS 1344-28-1)	PEL	5 mg/m3	Respirable fraction.
		15 mg/m3	Total dust.
Calcium carbonate (CAS 1317-65-3)	PEL	5 mg/m3	Respirable fraction.
		15 mg/m3	Total dust.
Fluorides, as F (CAS 16984-48-8)	PEL	2.5 mg/m3	
Iron oxide (CAS 1309-37-1)	PEL	10 mg/m3	Fume.
Kaolin (CAS 1332-58-7)	PEL	5 mg/m3	Respirable fraction.
		15 mg/m3	Total dust.
Manganese (CAS 7439-96-5)	Ceiling	5 mg/m3	Fume.
Molybdenum (CAS 7439-98-7)	PEL	15 mg/m3	Total dust.

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value	Form
Phosphorus (CAS 7723-14-0)	PEL	0.1 mg/m3	
Silicon (CAS 7440-21-3)	PEL	5 mg/m3	Respirable fraction.
		15 mg/m3	Total dust.
Titanium dioxide (CAS 13463-67-7)	PEL	15 mg/m3	Total dust.
Zinc oxide (CAS 1314-13-2)	PEL	5 mg/m3	Respirable fraction.
		5 mg/m3	Fume.
		15 mg/m3	Total dust.

US. OSHA Table Z-2 (29 CFR 1910.1000)

Components	Type	Value	Form
Fluorides, as F (CAS 16984-48-8)	TWA	2.5 mg/m3	Dust.

Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2)

Components	Type	Value	Form
Aluminum oxide (CAS 1344-28-1)	TWA	10 mg/m3	
Calcium carbonate (CAS 1317-65-3)	TWA	10 mg/m3	
Fluorides, as F (CAS 16984-48-8)	TWA	2.5 mg/m3	
Iron oxide (CAS 1309-37-1)	TWA	5 mg/m3	Respirable.
Kaolin (CAS 1332-58-7)	TWA	2 mg/m3	Respirable.
Manganese (CAS 7439-96-5)	TWA	0.2 mg/m3	
Phosphorus (CAS 7723-14-0)	TWA	0.1 mg/m3	
Sulfur (CAS 7704-34-9)	TWA	10 mg/m3	
Titanium dioxide (CAS 13463-67-7)	TWA	10 mg/m3	
Zinc oxide (CAS 1314-13-2)	STEL	10 mg/m3	Respirable.
	TWA	2 mg/m3	Respirable.

Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended)

Components	Type	Value	Form
Aluminum oxide (CAS 1344-28-1)	TWA	1 mg/m3	Respirable.
Calcium carbonate (CAS 1317-65-3)	STEL	20 mg/m3	Total dust.
	TWA	3 mg/m3	Respirable fraction.
		10 mg/m3	Total dust.
Fluorides, as F (CAS 16984-48-8)	TWA	2.5 mg/m3	
Iron oxide (CAS 1309-37-1)	STEL	10 mg/m3	Fume.
	TWA	5 mg/m3	Fume.
		5 mg/m3	Dust.
		3 mg/m3	Respirable fraction.
		10 mg/m3	Total dust.
Kaolin (CAS 1332-58-7)	TWA	2 mg/m3	Respirable.
Manganese (CAS 7439-96-5)	TWA	0.2 mg/m3	
Molybdenum (CAS 7439-98-7)	TWA	3 mg/m3	Respirable.
		10 mg/m3	Inhalable
Phosphorus (CAS 7723-14-0)	TWA	0.1 mg/m3	
Titanium dioxide (CAS 13463-67-7)	TWA	3 mg/m3	Respirable fraction.

Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended)

Components	Type	Value	Form
		10 mg/m3	Total dust.
Zinc oxide (CAS 1314-13-2)	STEL	10 mg/m3	Respirable.
	TWA	2 mg/m3	Respirable.

Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act)

Components	Type	Value	Form
Aluminum oxide (CAS 1344-28-1)	TWA	1 mg/m3	Respirable fraction.
Fluorides, as F (CAS 16984-48-8)	TWA	2.5 mg/m3	
Iron oxide (CAS 1309-37-1)	TWA	5 mg/m3	Respirable fraction.
Kaolin (CAS 1332-58-7)	TWA	2 mg/m3	Respirable fraction.
Manganese (CAS 7439-96-5)	TWA	0.1 mg/m3	Inhalable fraction.
		0.02 mg/m3	Respirable fraction.
Molybdenum (CAS 7439-98-7)	TWA	3 mg/m3	Respirable fraction.
		10 mg/m3	Inhalable fraction.
Phosphorus (CAS 7723-14-0)	TWA	0.1 mg/m3	
Titanium dioxide (CAS 13463-67-7)	TWA	10 mg/m3	
Zinc oxide (CAS 1314-13-2)	STEL	10 mg/m3	Respirable fraction.
	TWA	2 mg/m3	Respirable fraction.

Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents)

Components	Type	Value	Form
Aluminum oxide (CAS 1344-28-1)	TWA	1 mg/m3	Respirable fraction.
Fluorides, as F (CAS 16984-48-8)	TWA	2.5 mg/m3	
Iron oxide (CAS 1309-37-1)	TWA	5 mg/m3	Respirable fraction.
Kaolin (CAS 1332-58-7)	TWA	2 mg/m3	Respirable fraction.
Manganese (CAS 7439-96-5)	TWA	0.2 mg/m3	
Molybdenum (CAS 7439-98-7)	TWA	10 mg/m3	Inhalable fraction.
Phosphorus (CAS 7723-14-0)	TWA	0.1 mg/m3	
Silicon (CAS 7440-21-3)	TWA	10 mg/m3	Total dust.
Titanium dioxide (CAS 13463-67-7)	TWA	10 mg/m3	
Zinc oxide (CAS 1314-13-2)	STEL	10 mg/m3	Respirable fraction.
	TWA	2 mg/m3	Respirable fraction.

Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment)

Components	Type	Value	Form
Aluminum oxide (CAS 1344-28-1)	TWA	10 mg/m3	Total dust.
Calcium carbonate (CAS 1317-65-3)	TWA	10 mg/m3	Total dust.
Fluorides, as F (CAS 16984-48-8)	TWA	2.5 mg/m3	
Iron oxide (CAS 1309-37-1)	TWA	5 mg/m3	Dust and fume.
		10 mg/m3	Total dust.
Kaolin (CAS 1332-58-7)	TWA	5 mg/m3	Respirable dust.
Manganese (CAS 7439-96-5)	STEL	3 mg/m3	Fume.
	TWA	5 mg/m3	Dust.

Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment)

Components	Type	Value	Form
		1 mg/m3	Fume.
Molybdenum (CAS 7439-98-7)	TWA	10 mg/m3	
Phosphorus (CAS 7723-14-0)	TWA	0.1 mg/m3	
Silicon (CAS 7440-21-3)	TWA	10 mg/m3	Total dust.
Titanium dioxide (CAS 13463-67-7)	TWA	10 mg/m3	Total dust.
Zinc oxide (CAS 1314-13-2)	STEL	10 mg/m3	Fume.
	TWA	5 mg/m3	Fume.
		10 mg/m3	Total dust.

Mexico. Occupational Exposure Limit Values

Components	Type	Value	Form
Aluminum oxide (CAS 1344-28-1)	TWA	10 mg/m3	
Calcium carbonate (CAS 1317-65-3)	STEL	20 mg/m3	
	TWA	10 mg/m3	
Fluorides, as F (CAS 16984-48-8)	TWA	2.5 mg/m3	
Iron oxide (CAS 1309-37-1)	STEL	10 mg/m3	
	TWA	5 mg/m3	
Kaolin (CAS 1332-58-7)	STEL	20 mg/m3	
	TWA	10 mg/m3	
Manganese (CAS 7439-96-5)	STEL	3 mg/m3	Fume.
	TWA	1 mg/m3	Fume.
		0.2 mg/m3	
Molybdenum (CAS 7439-98-7)	STEL	20 mg/m3	
	TWA	10 mg/m3	
Phosphorus (CAS 7723-14-0)	STEL	0.3 mg/m3	
	TWA	0.1 mg/m3	
Silicon (CAS 7440-21-3)	STEL	20 mg/m3	
	TWA	10 mg/m3	
Titanium dioxide (CAS 13463-67-7)	STEL	20 mg/m3	
	TWA	10 mg/m3	
Zinc oxide (CAS 1314-13-2)	STEL	10 mg/m3	Fume.
	TWA	5 mg/m3	Fume.
		10 mg/m3	Dust.

Engineering controls Provide adequate ventilation. Observe occupational exposure limits and minimize the risk of inhalation of dust and fumes. Shower, hand and eye washing facilities near the workplace are recommended.

Personal protective equipment

Eye / face protection Wear safety glasses with side shields (or goggles). When welding, it is recommended that safety glasses, goggles, or face-shield with filter lens of appropriate shade number (per ANSI Z49.1-1988, “Safety in Welding and Cutting”) be worn.

Skin protection Protective clothing is recommended. When welding, wear protective clothing that protects from sparks and flame (per ANSI Z49.1-1988, “Safety in Welding and Cutting”).

Respiratory protection Use a respirator when local exhaust or ventilation is not adequate to keep exposures below the TLV. In a confined space a supplied respirator may be required. Selection and use of respiratory protective equipment should be in accordance with OSHA General Industry Standard 29 CFR 1910.134; or in Canada with CSA Standard Z94.4. Use a NIOSH/MSHA approved respirator if there is a risk of exposure to dust/fume at levels exceeding the exposure limits.

General hygiene considerations 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

Appearance	Coated metal rods.
Physical state	Solid.
Form	Solid.
Color	Not available.
Odor	Odorless.
Odor threshold	Not available.
pH	Not applicable.
Vapor pressure	Not applicable
Vapor density	Not applicable.
Boiling point	5432 °F (3000 °C) as Iron
Melting point/Freezing point	2795 °F (1535 °C) as Iron
Solubility (water)	Insoluble.
Specific gravity	7.86 @20°C as Iron
Flash point	Not available.
Flammability limits in air, upper, % by volume	Not available.
Flammability limits in air, lower, % by volume	Not available.
Auto-ignition temperature	Not available.

10. Chemical Stability & Reactivity Information

Chemical stability	Material is stable under normal conditions.
Conditions to avoid	Contact with incompatible materials.
Incompatible materials	Strong oxidizing agents. Strong acids. Strong bases. Acetylene. Ammonia. Hydrogen peroxide (H_2O_2). Chlorine. Bromine, iodine, turpentine, magnesium metal. Hydrogen sulfide. Ammonium nitrate.
Hazardous decomposition products	Toxic metal oxides are emitted when heated above the melting point. Welding fumes and gases cannot be classified simply. The composition and quantity of both are dependent upon the metal being welded, the process, procedure and electrodes used. Other conditions which also influence the composition and quantity of the fumes and gases to which workers may be exposed include: coatings on the metal being welded (such as paint, plating, or galvanizing), the number of welders and the volume of the worker area, the quality and amount of ventilation, the position of the welder's head with respect to the fume plume, as well as the presence of contaminants in the atmosphere (such as chlorinated hydrocarbon vapors from cleaning and degreasing activities.) Fumes can be reasonably expected to include: Metal oxides. Fluoride fumes.
Possibility of hazardous reactions	Hazardous polymerization does not occur.

11. Toxicological Information

Toxicological data

Components	Species	Test Results
Calcium Fluoride (CAS 7789-75-5)		
Acute		
Oral		
LD50	Rat	4250 mg/kg
Other		
LD50	Mouse	2638 mg/kg
Iron (CAS 7439-89-6)		
Acute		
Oral		
LD50	Rat	30 g/kg

Components	Species	Test Results
Kaolin (CAS 1332-58-7)		
Acute		
Dermal		
LD50	Rat	> 5000 mg/kg
Oral		
LD50	Rat	> 5000 mg/kg
Manganese (CAS 7439-96-5)		
Acute		
Oral		
LD50	Rat	9000 mg/kg
Silicon (CAS 7440-21-3)		
Acute		
Oral		
LD50	Rat	3160 mg/kg
Sodium silicate (CAS 1344-09-8)		
Acute		
Oral		
LD50	Mouse	1100 mg/kg
	Rat	1.1 g/kg

Sensitization This product is not expected to cause skin sensitization.

Acute effects When heated, the vapors/fumes given off may cause respiratory tract irritation. High concentrations of freshly formed fumes/dusts of metal oxides can produce symptoms of metal fume fever. Exposure to extremely high levels of fluorides can cause abdominal pain, diarrhea, muscular weakness, and convulsions. In extreme cases it can cause loss of consciousness and death.

Local effects Elevated temperatures or mechanical action may form dust and fumes which may be irritating to the eye, mucous membranes and respiratory tract.

Chronic effects Repeated exposure to fluorides may cause excessive calcification of the bone and calcification of ligaments of the ribs, pelvis and spinal column. Absorbed fluoride can cause metabolic imbalances with irregular heartbeat, nausea, dizziness, vomiting and seizures. Chronic inhalation of high concentrations of iron oxide fumes or dust may lead to benign pneumoconiosis (siderosis). Overexposure to manganese fumes may affect the brain and central nervous system, resulting in poor coordination, difficulty speaking, and arm or leg tremor. This condition can be irreversible Ingestion of silver may cause a permanently benign bluish gray discoloration to the skin (argyria).

Carcinogenicity Titanium Dioxide is listed by IARC as possibly carcinogenic to humans (Group 2B). This listing is based on inadequate evidence of carcinogenicity in humans and sufficient evidence in experimental animals. Titanium dioxide is considered carcinogenic only when in an inhalable powdered form.

ACGIH Carcinogens

Aluminum oxide (CAS 1344-28-1)	A4 Not classifiable as a human carcinogen.
Calcium Fluoride (CAS 7789-75-5)	A4 Not classifiable as a human carcinogen.
Fluorides, as F (CAS 16984-48-8)	A4 Not classifiable as a human carcinogen.
Iron oxide (CAS 1309-37-1)	A4 Not classifiable as a human carcinogen.
Kaolin (CAS 1332-58-7)	A4 Not classifiable as a human carcinogen.
Manganese (CAS 7439-96-5)	A4 Not classifiable as a human carcinogen.
Molybdenum (CAS 7439-98-7)	A3 Confirmed animal carcinogen with unknown relevance to humans.
Titanium dioxide (CAS 13463-67-7)	A4 Not classifiable as a human carcinogen.

IARC Monographs. Overall Evaluation of Carcinogenicity

Calcium Fluoride (CAS 7789-75-5)	3 Not classifiable as to carcinogenicity to humans.
Fluorides, as F (CAS 16984-48-8)	3 Not classifiable as to carcinogenicity to humans.
Iron oxide (CAS 1309-37-1)	3 Not classifiable as to carcinogenicity to humans.
Titanium dioxide (CAS 13463-67-7)	2B Possibly carcinogenic to humans.

Epidemiology Based on epidemiological studies, pre-existing pulmonary disorders may be aggravated by prolonged exposure to high concentrations of metal dust or fumes.

Mutagenicity	No data available.
Reproductive effects	This product is not reported to cause reproductive effects in humans. Manganese metal may damage the reproductive system and has shown teratogenic effects in laboratory animals.
Further information	No other specific acute or chronic health impact noted.

12. Ecological Information

Ecotoxicological data

Components		Species	Test Results
Iron (CAS 7439-89-6)			
Aquatic			
Fish	LC50	Channel catfish (Ictalurus punctatus)	> 500 mg/l, 96 hours
Molybdenum (CAS 7439-98-7)			
Aquatic			
Fish	LC50	Rainbow trout,donaldson trout (Oncorhynchus mykiss)	800 mg/l, 96 hours
Sodium silicate (CAS 1344-09-8)			
Aquatic			
Crustacea	EC50	Water flea (Ceriodaphnia dubia)	0.28 - 0.57 mg/l, 48 hours
Fish	LC50	Western mosquitofish (Gambusia affinis)	1800 mg/l, 96 hours
Zinc oxide (CAS 1314-13-2)			
Aquatic			
Crustacea	LC50	Water flea (Daphnia magna)	0.098 mg/l, 48 Hours

Ecotoxicity	Alloys in massive forms present a limited hazard for the environment.
Environmental effects	Significant environmental persistence and bioaccumulation can be expected.
Persistence and degradability	The product is not biodegradable.
Bioaccumulation / Accumulation	The product contains potentially bioaccumulating substances.
Mobility in environmental media	Alloys in massive forms are not mobile in the environment.

13. Disposal Considerations

Waste codes	The waste code should be assigned in discussion between the user, the producer and the waste disposal company.
Disposal instructions	Dispose in accordance with all applicable regulations.
Waste from residues / unused products	Scrapped material should be sent for refining to recover precious metal content. Solid metal and alloys in the form of particles may be reactive. Its hazardous characteristics, including fire and explosion, should be determined prior to disposal.
Contaminated packaging	Since emptied containers may retain product residue, follow label warnings even after container is emptied.

14. Transport Information

DOT

Not regulated as a hazardous material by DOT.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

TDG

Not regulated as dangerous goods.

15. Regulatory Information

US federal regulations	This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200. All components are on the U.S. EPA TSCA Inventory List.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Manganese (CAS 7439-96-5)
Phosphorus (CAS 7723-14-0)

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

Phosphorus (CAS 7723-14-0)	1 lbs

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

Phosphorus (CAS 7723-14-0)	100 lbs

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

Aluminum oxide (CAS 1344-28-1)	1.0 %
Manganese (CAS 7439-96-5)	1.0 %
Phosphorus (CAS 7723-14-0)	1.0 %
Vanadium (CAS 7440-62-2)	1.0 %
Zinc oxide (CAS 1314-13-2)	1.0 % N982

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

Aluminum oxide (CAS 1344-28-1)	Listed.
Manganese (CAS 7439-96-5)	Listed.
Phosphorus (CAS 7723-14-0)	Listed.
Vanadium (CAS 7440-62-2)	Listed.
Zinc oxide (CAS 1314-13-2)	N982 Listed.

CERCLA (Superfund) reportable quantity (lbs) (40 CFR 302.4)

Phosphorus: 1

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories

Immediate Hazard - Yes
Delayed Hazard - Yes
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - No

SARA 302 Extremely hazardous substance

Chemical name	CAS number	Reportable quantity	Threshold planning quantity	Threshold planning quantity, lower value	Threshold planning quantity, upper value
Phosphorus	7723-14-0	1	100 lbs		

SARA 311/312 Hazardous chemical

Yes

Drug Enforcement Administration (DEA) (21 CFR 1308.11-15)

Not controlled

Canadian regulations

This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

WHMIS status

Controlled

WHMIS classification

D2A - Other Toxic Effects-VERY TOXIC
D2B - Other Toxic Effects-TOXIC

WHMIS labeling

Inventory status

Country(s) or region	Inventory name	On inventory (yes/no)*
Canada	Domestic Substances List (DSL)	No
Canada	Non-Domestic Substances List (NDSL)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	No

*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s).
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

State regulations

WARNING: This product contains chemical(s) known to the State of California to cause cancer and birth defects or other reproductive harm.

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

Aluminum oxide (CAS 1344-28-1)	Listed.
Calcium Fluoride (CAS 7789-75-5)	Listed.
Fluorides, as F (CAS 16984-48-8)	Listed.
Iron (CAS 7439-89-6)	Listed.
Iron oxide (CAS 1309-37-1)	Listed.
Manganese (CAS 7439-96-5)	Listed.
Molybdenum (CAS 7439-98-7)	Listed.
Phosphorus (CAS 7723-14-0)	Listed.
Sulfur (CAS 7704-34-9)	Listed.
Vanadium (CAS 7440-62-2)	Listed.
Zinc oxide (CAS 1314-13-2)	Listed.

US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance

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

US - California Proposition 65 - CRT: Listed date/Carcinogenic substance

Titanium dioxide (CAS 13463-67-7)	Listed: September 2, 2011 Carcinogenic.

US. Massachusetts RTK - Substance List

Aluminum oxide (CAS 1344-28-1)	Listed.
Calcium carbonate (CAS 1317-65-3)	Listed.
Iron oxide (CAS 1309-37-1)	Listed.
Kaolin (CAS 1332-58-7)	Listed.
Manganese (CAS 7439-96-5)	Listed.
Molybdenum (CAS 7439-98-7)	Listed.
Phosphorus (CAS 7723-14-0)	Listed.
Silicon (CAS 7440-21-3)	Listed.
Sulfur (CAS 7704-34-9)	Listed.
Titanium dioxide (CAS 13463-67-7)	Listed.
Vanadium (CAS 7440-62-2)	Listed.
Zinc oxide (CAS 1314-13-2)	Listed.

US. New Jersey Worker and Community Right-to-Know Act

Aluminum oxide (CAS 1344-28-1)
Calcium carbonate (CAS 1317-65-3)
Calcium Fluoride (CAS 7789-75-5)
Fluorides, as F (CAS 16984-48-8)
Iron oxide (CAS 1309-37-1)
Kaolin (CAS 1332-58-7)
Manganese (CAS 7439-96-5)
Molybdenum (CAS 7439-98-7)
Phosphorus (CAS 7723-14-0)
Silicon (CAS 7440-21-3)
Sulfur (CAS 7704-34-9)
Titanium dioxide (CAS 13463-67-7)
Vanadium (CAS 7440-62-2)
Zinc oxide (CAS 1314-13-2)

US. Pennsylvania Worker and Community Right-to-Know Law

Aluminum oxide (CAS 1344-28-1)
Calcium carbonate (CAS 1317-65-3)
Calcium Fluoride (CAS 7789-75-5)
Fluorides, as F (CAS 16984-48-8)
Iron oxide (CAS 1309-37-1)
Kaolin (CAS 1332-58-7)
Manganese (CAS 7439-96-5)
Molybdenum (CAS 7439-98-7)
Phosphorus (CAS 7723-14-0)
Silicon (CAS 7440-21-3)
Sulfur (CAS 7704-34-9)
Titanium dioxide (CAS 13463-67-7)
Vanadium (CAS 7440-62-2)
Zinc oxide (CAS 1314-13-2)

16. Other Information

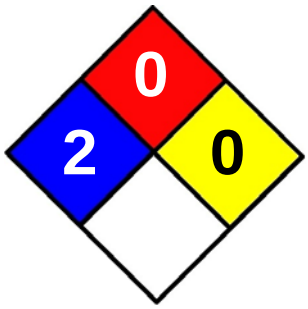
Further information

HMIS® is a registered trade and service mark of the NPCA.
A HMIS® Health rating including an * indicates a chronic hazard.

HMIS® ratings

Health: 2*
Flammability: 0
Physical hazard: 0

NFPA Ratings



Disclaimer

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