American Zinc Recycling
4955 Steubenville Pike, Suite 405
Pittsburgh, PA, USA 15205
Telephone: (724) 773-2223

SAFETY DATA SHEET

SECTION 1. IDENTIFICATION

Product identifier used on the label

: **Flue dust, zinc-refining**

Product Code(s) : Zinc rich flue dust
AZR Grade: Crude zinc calcine

Recommended use of the chemical and restrictions on use

: Raw material for production of zinc metal.

Chemical family : Calcined zinc oxide enriched flue dust (Inorganic substances in powdered form)

Name, address, and telephone number of the manufacturer:

American Zinc Recycling
4955 Steubenville Pike, Suite 405
Pittsburgh, PA, USA
15205

Manufacturer's Telephone # : (724) 773-2223

Name, address, and telephone number of the supplier:

Refer to manufacturer

24 Hr. Emergency Tel # : Chemtrec 1-800-424-9300 (Within Continental U.S.); Chemtrec 703-527-3887 (Outside U.S.).

SECTION 2. HAZARDS IDENTIFICATION

Classification of the chemical

Yellow green to reddish brown solid (powder or granules). Odorless.

Most important hazards:
Causes skin irritation. Causes serious eye damage. Continuous long-term exposure above the permissible exposure limits are suspected to cause genetic defects, sterility, cancer, and/or organ damage. Contains a small amount of lead and lead compounds that can be toxic at elevated exposure levels. Occupational exposure to the substance or mixture may cause adverse effects. For further information, please refer to section 11 of the SDS.

Harmful to aquatic life with long lasting effects. Avoid release to the environment. See Section 12 for more environmental information.

This material is classified as hazardous under U.S. OSHA regulations (29CFR 1910.1200) (Hazcom 2012) and Canadian WHMIS regulations (Hazardous Products Regulations) (WHMIS 2015). Classification:
Skin corrosion/irritation - Category 2
Serious eye damage/eye irritation - Category 1
Germ cell mutagenicity - Category 2
Reproductive toxicity - Category 1A
Carcinogenicity - Category 1B
Specific target organ toxicity, repeated exposure - Category 1

Label elements

Hazard pictogram(s)

Signal Word
DANGER!

Hazard statement(s)
Causes skin irritation.
Causes serious eye damage.
Suspected of causing genetic defects.
May cause cancer.
May damage fertility or the unborn child.
Causes damage to organs through prolonged or repeated exposure.

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Precautionary statement(s)
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Do not breathe dust or fume.
Wash exposed skin thoroughly after handling.
Do not eat, drink or smoke when using this product.
Wear protective gloves/clothing and eye/face protection.

IF exposed or concerned: Get medical advice/attention.
IF ON SKIN: Wash with plenty of soap and water. If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash it before reuse.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/physician.

Store locked up.

Dispose of contents/container in accordance with local regulation.

Other hazards

Other hazards which do not result in classification:
Inhalation of fumes may result in metal fume fever, a flu-like illness. Mild respiratory irritant. May cause gastrointestinal irritation. Iron particles in the eye may leave a "rust ring" or brownish stain on the cornea.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Calcined zinc oxide enriched flue dust (Inorganic substances in powdered form).

Chemical name	Common name and synonyms	CAS #	Concentration (% by weight)
Flue dust, zinc-refining	Crude zinc calcine	69012-63-1	**100%**
Flue dust constituents:			
Zinc	Present as metal oxide.	7440-66-6	60.0 - 70.0
Iron	Present as metal oxide.	7439-89-6	2.0 - 6.0
Fluorine	N/Av	7782-41-4	3.0 - 5.5
Calcium	Present as metal oxide.	7440-70-2	1.0 - 2.0
Silicon dioxide	Amorphous silica	7631-86-9	0.13 - 2
Sulphur	Present as metal oxide.	7704-34-9	0.1 - 1.1
Magnesium	Present as metal oxide.	7439-95-4	0.4 - 1.0
Potassium	Present as metal oxide.	7440-09-7	0.06 - 0.8
Manganese	Present as metal oxide.	7439-96-5	0.3 - 0.7
Lead	Present as metal oxide.	7439-92-1	0.04 - 0.7
Chlorine	N/Av	7782-50-5	0.05 - 0.66
Aluminium oxide	Alumina	1344-28-1	0.1 - 0.5
Carbon	N/Av	7440-44-0	0.02 - 0.23
Chromium	Present as metal oxide.	7440-47-3	0.07 - 0.14
Copper	Present as metal oxide.	7440-50-8	0.05 - 0.08
Cadmium	Present as metal oxide.	7440-43-9	0.0 - 0.06

SECTION 4. FIRST-AID MEASURES

Description of first aid measures

Ingestion : Do NOT induce vomiting. Rinse mouth. Never give anything by mouth to an unconscious person. IF exposed or concerned: Get medical advice/attention.

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Inhalation : If inhaled, move to fresh air. If breathing is difficult, give oxygen by qualified medical personnel only. If breathing stops, provide artificial respiration. IF exposed or concerned: Get medical attention/advice.

Skin contact : IF ON SKIN: Wash with plenty of soap and water. If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash it before reuse.

Eye contact : IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/physician.

Most important symptoms and effects, both acute and delayed

: Causes skin irritation. Symptoms include redness, swelling and sloughing of skin cells (flaking).
Causes serious eye damage. Contact may cause redness, swelling and a painful sensation. May cause irreversible eye damage.
Suspected of causing genetic defects.
May cause cancer. Symptoms may include persistent coughing, shortness of breath, coughing up blood and wheezing.
May damage fertility or the unborn child. Symptoms may include spontaneous abortion, pre-term delivery, stillbirths, alterations in sperm, decreased male fertility, and effects on neurological development including decreased intelligence, shortened attention span, and slowed reaction times.
Causes damage to organs through prolonged or repeated exposure if swallowed. Contains lead and lead compounds. Prolonged overexposure may result in lead toxicity syndrome which may result in permanent damage or death. Lead poisoning is characterized by a metallic taste in the mouth, loss of appetite, indigestion, nausea, vomiting, constipation, abdominal cramps, disturbance of rest and sleep, and weakness. Additional symptoms may include a blue "lead line" on the gums and an accumulation of lead in the blood resulting in shock, coma and death.
Mild respiratory irritant. May cause coughing and breathing difficulties. Inhalation of fumes may result in metal fume fever, a flu-like illness. Symptoms of metal fume fever may include fever, fatigue, vomiting, muscle aches and shortness of breath.
Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.
Iron particles in the eye may leave a "rust ring" or brownish stain on the cornea.

Indication of any immediate medical attention and special treatment needed

: Provide general supportive measures and treat symptomatically.

SECTION 5. FIRE-FIGHTING MEASURES

Extinguishing media

Suitable extinguishing media

: Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Unsuitable extinguishing media

: None known.

Special hazards arising from the substance or mixture / Conditions of flammability

: Not considered flammable. Closed containers may rupture if exposed to excess heat or flame due to a build-up of internal pressure.

Flammability classification (OSHA 29 CFR 1910.106)

: Not classified as flammable.

Hazardous combustion products

: Metal oxides

Special protective equipment and precautions for firefighters

Protective equipment for fire-fighters

: Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA.
Firefighters should wear proper protective equipment and self-contained breathing apparatus with full face piece operated in positive pressure mode.

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Special fire-fighting procedures

: Move containers from fire area if safe to do so. Cool closed containers exposed to fire with water spray. Do not allow run-off from fire fighting to enter drains or water courses. Dike for water control.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

: Wear suitable protective equipment. Keep people away from and upwind of spill/leak. Restrict access to area until completion of clean-up. Refer to protective measures listed in sections 7 and 8.

Environmental precautions : Do not allow material to enter ground water system. Discharge into the environment must be avoided.

Methods and material for containment and cleaning up

: Ventilate the area. Prevent further leakage or spillage if safe to do so. Sweep up and shovel into suitable containers for disposal. Avoid dust formation. Contact the proper local authorities. Clean contaminated floors and objects thoroughly while observing environmental regulations. For waste disposal, see Section 13 of the SDS.

Special spill response procedures

: If a spill/release in excess of the EPA reportable quantity is made into the environment, immediately notify the national response center in the United States (phone: 1-800-424-8802).
US CERCLA Reportable quantity (RQ): Zinc (1000 lbs / 454 kg); Fluorine (10 lbs / 4.54 kg); Lead (10 lbs / 4.54 kg); Chlorine (10 lbs / 4.54 kg); chromium (5000 lbs / 2270 kg); Copper (5000 lbs / 2270 kg); Cadmium (10 lbs / 4.54 kg)

In Canada: Contact appropriate local and provincial environmental authorities for assistance and/or reporting requirements.

SECTION 7. HANDLING AND STORAGE

Precautions for safe handling

: Do not handle until all safety precautions have been read and understood. Obtain special instructions before use.
Use only in well-ventilated areas. Wear suitable protective equipment during handling. Wear protective gloves/clothing and eye/face protection. Do not breathe dust or fume. Do not ingest. Avoid contact with skin, eyes and clothing. Keep away from heat. Keep away from acids and other incompatibles. Avoid and control operations which create high vapor or dust concentrations. Wash thoroughly after handling.

Conditions for safe storage : Store in a cool, well-ventilated area. Keep away from heat. Inspect periodically for damage or leaks. Store away from incompatible materials. Storage area should be clearly identified, clear of obstruction and accessible only to trained and authorized personnel. Store locked up.

Incompatible materials : Acids; Halogenated compounds; Nitrogen compounds; Oxidizing agents.

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SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Limits:

Chemical Name	ACGIH TLV		OSHA PEL	
	TWA	STEL	PEL	STEL
Flue dust, zinc-refining	N/Av	N/Av	N/Av	N/Av
Zinc	N/Av	N/Av	N/Av	N/Av
Iron	N/Av	N/Av	N/Av	N/Av
Fluorine	1 ppm	2 ppm	0.1 ppm (0.2 mg/m³)	N/Av
Calcium	N/Av	N/Av	N/Av	N/Av
Silicon dioxide	10 mg/m³ (inhalable); 3 mg/m³ (respirable) (PNOS)	N/Av	15 mg/m³ (total dust); 5 mg/m³ (respirable) (PNOR)	N/Av
Sulphur	N/Av	N/Av	N/Av	N/Av
Magnesium	N/Av	N/Av	N/Av	N/Av
Potassium	N/Av	N/Av	N/Av	N/Av
Manganese	0.02 mg/m³ (respirable); 0.1 mg/m³ (inhalable)	N/Av	5 mg/m³ (fume)	N/Av
Lead	0.05 mg/m³	N/Av	50 µg/m3	N/Av
Chlorine	0.5 ppm	1 ppm	1 ppm (3 mg/m³) (Ceiling)	N/Av
Aluminium oxide	1 mg/m³ (respirable)	N/Av	15 mg/m³ (total dust); 5 mg/m³ (respirable)	N/Av
Carbon	2 mg/m³ (respirable)	N/Av	15 mg/m³ (total dust); 5 mg/m³ (respirable) (PNOR)	N/Av
Chromium	0.5 mg/m³	N/Av	1 mg/m³	N/Av
Copper	0.2 mg/m³ (fume); 1 mg/m³ (Dust and mist)	N/Av	0.1 mg/m³ (fume); 1 mg/m³ (Dust and mist)	N/Av
Cadmium	0.01 mg/m³; 0.002 mg/m³ (Respirable fraction)	N/Av	0.1 mg/m³ (fume); 0.2 mg/m³ (dust); 5 µg/m3	N/Av

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Exposure controls

Ventilation and engineering measures : Use in a well-ventilated area. Apply technical measures to comply with the occupational exposure limits. Where reasonably practicable this should be achieved by the use of local exhaust ventilation and good general extraction.
The local exhaust ventilation system should be high efficiency (84%).
Recommended cyclone/filter (for minimizing dust emissions) efficiency:
70-90% (cyclones);
50-80% (dust filters);
85-95% (double stage, cassette filters)
Process enclosure should be considered, especially in potentially dusty units.
In case of insufficient ventilation wear suitable respiratory equipment.

Respiratory protection : Wear NIOSH approved dust masks. The filter class for the respirator must be suitable for the maximum expected contaminant concentration (gas/vapor/aerosol/particulates) that may arise when handling the product. If this concentration is exceeded, self-contained breathing apparatus must be used. Recommended Filter type:
dust filter-half mask P1 (efficiency 75%)
dust filter-half mask P2 (efficiency 90%)
dust filter-half mask P3 (efficiency 95%)
dust filter-full mask P1 (efficiency 75%)
Respirators should be selected based on the form and concentration of contaminants in air, and in accordance with OSHA (29 CFR 1910.134) or CSA Z94.4-02.

Skin protection : Wear protective gloves/clothing. The suitability for a specific workplace should be discussed with the producers of the protective gloves. Gloves are recommended to be ≥ 90% efficient. Choose body protection according to the amount and concentration of the dangerous substance at the work place.

Eye / face protection : Chemical goggles must be worn to prevent dusts from entering the eyes.

Other protective equipment : Ensure that eyewash stations and safety showers are close to the workstation location. Other equipment may be required depending on workplace standards.

General hygiene considerations : Avoid contact with skin, eyes and clothing. Do not breathe dust or fume. Do not eat, drink or smoke when using this product. Wash hands and face before breaks and immediately after handling the product. Wash contaminated clothing before reuse. Handle in accordance with good industrial hygiene and safety practice.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	solid (Powder/granular); yellow green to reddish brown.
Odor	:	No odor.
Odor threshold	:	None.
pH	:	N/Av
Melting/Freezing point	:	> 1000°C (1830°F)
Initial boiling point and boiling range	:	> 1000°C (1830°F)
Flash point	:	None.
Flashpoint (Method)	:	Not applicable.
Evaporation rate (BuAe = 1)	:	N/Av
Flammability (solid, gas)	:	The product is not flammable.
Lower flammable limit (% by vol.)	:	None.
Upper flammable limit (% by vol.)	:	None.
Oxidizing properties	:	None known.
Explosive properties	:	Not explosive
Vapor pressure	:	N/Av
Vapor density	:	N/Av

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Relative density / Specific gravity
: 4.83

Solubility in water : insoluble

Other solubility(ies) : N/Av

Partition coefficient: n-octanol/water or Coefficient of water/oil distribution
: N/Av

Auto-ignition temperature : None.

Decomposition temperature : N/Av

Viscosity : Not applicable.

Volatiles (% by weight) : N/Av

Volatile organic Compounds (VOC's)
: N/Av

Absolute pressure of container
: N/Ap

Flame projection length : N/Ap

Other physical/chemical comments
: No additional information.

SECTION 10. STABILITY AND REACTIVITY

Reactivity : Not normally reactive.

Chemical stability : Stable under normal conditions.

Possibility of hazardous reactions
: Hazardous polymerization does not occur.

Conditions to avoid : Direct sources of heat. Incompatible products Do not use in areas without adequate ventilation.

Incompatible materials : Acids; Halogenated compounds; Nitrogen compounds; Oxidizing agents

Hazardous decomposition products
: None known, refer to hazardous combustion products in Section 5.

SECTION 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure:

Routes of entry inhalation : YES

Routes of entry skin & eye : YES

Routes of entry Ingestion : YES

Routes of exposure skin absorption
: NO

Potential Health Effects:

Signs and symptoms of short-term (acute) exposure

Sign and symptoms Inhalation

: May cause irritation of the mucous membranes. Inhalation of dust may cause shortness of breath, tightness of the chest, a sore throat and cough. Inhalation of fumes may result in metal fume fever, a flu-like illness. Symptoms of metal fume fever may include fever, fatigue, vomiting, muscle aches and shortness of breath.

Sign and symptoms ingestion

: Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.

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Sign and symptoms skin	:	Causes skin irritation. Symptoms include redness, swelling and sloughing of skin cells (flaking).
Sign and symptoms eyes	:	Causes serious eye damage. Contact may cause redness, swelling and a painful sensation. May cause irreversible eye damage.
Potential Chronic Health Effects	:	Pneumoconiosis, or “dusty lung” disease, may result from chronic exposure to any dust. Repeated or prolonged inhalation of fine dusts may cause an increase in mucous production. Overexposure to lead dust and fumes adversely affects blood and blood forming tissues, kidneys, liver and the central/peripheral nervous systems and male/female reproductive organs.
Mutagenicity	:	This material is classified as hazardous under U.S. OSHA regulations (29CFR 1910.1200) (Hazcom 2012) and Canadian WHMIS regulations (Hazardous Products Regulations) (WHMIS 2015). Classification: Germ cell mutagenicity - Category 2. Suspected of causing genetic defects. Contains: lead and lead compounds; Cadmium. Lead is known to cause mutations in both non-reproductive (somatic) cells and reproductive (germ) cells. Cadmium may cause irreversible effects in non-reproductive (somatic) cells, based on animal data.
Carcinogenicity	:	This material is classified as hazardous under U.S. OSHA regulations (29CFR 1910.1200) (Hazcom 2012) and Canadian WHMIS regulations (Hazardous Products Regulations) (WHMIS 2015). Classification: Carcinogenicity - Category 1B. May cause cancer. Symptoms may include persistent coughing, shortness of breath, coughing up blood and wheezing. Contains: lead and lead compounds; Cadmium. Lead is classified as possibly carcinogenic by IARC (Group 2A), the ACGIH (Category A3), the NTP (reasonably anticipated) and OSHA. Cadmium and Cadmium compounds are classified as carcinogenc by IARC (Group 1), the ACGIH (Category A2), the NTP (Known human carcinogen) and OSHA.
Reproductive effects & Teratogenicity	:	This material is classified as hazardous under U.S. OSHA regulations (29CFR 1910.1200) (Hazcom 2012) and Canadian WHMIS regulations (Hazardous Products Regulations) (WHMIS 2015). Classification: Reproductive toxicant - Category 1A. May damage fertility or the unborn child. Symptoms may include spontaneous abortion, pre-term delivery, stillbirths, alterations in sperm, decreased male fertility, and effects on neurological development including decreased intelligence, shortened attention span, and slowed reaction times. Contains: lead compounds. Lead compounds are known to cause certain reproductive effects in both males and females. Lead compounds are known to cause embryotoxicity.
Sensitization to material	:	Not expected to be a skin or respiratory sensitizer.
Specific target organ effects	:	This material is classified as hazardous under U.S. OSHA regulations (29CFR 1910.1200) (Hazcom 2012) and Canadian WHMIS regulations (Hazardous Products Regulations) (WHMIS 2015). Classification: Specific target organ toxicity, repeated exposure - Category 1. Causes damage to organs through prolonged or repeated exposure. Contains lead and lead compounds. Prolonged overexposure may result in lead toxicity syndrome which may result in permanent damage or death. Lead poisoning is characterized by a metallic taste in the mouth, loss of appetite, indigestion, nausea, vomiting, constipation, abdominal cramps, disturbance of rest and sleep, and weakness. Additional symptoms may include a blue "lead line" on the gums and an accumulation of lead in the blood resulting in shock, coma and death. According to the classification criteria of U.S. OSHA regulations (29CFR 1910.1200) (Hazcom 2012) and Canadian WHMIS regulations (Hazardous Products Regulations) (WHMIS 2015), this product is not expected to cause target organ toxicity through single exposures.

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Medical conditions aggravated by overexposure
: Pre-existing eye, skin, respiratory, liver, kidney and central nervous system disorders.

Synergistic materials : None known or reported by the manufacturer.

Toxicological data : See below for toxicological data on the substance.

Chemical name	LC_{50} (4hr) inh, rat	LD_{50} (Oral, rat)	LD_{50} (Rabbit, dermal)
Flue dust, zinc-refining	**> 5.371 mg/L**	**> 2000 mg/kg**	**> 2000 mg/kg**
Flue dust constituents:			
Zinc	> 5.4 mg/L (dust) (No mortality)	> 2000 mg/kg (No mortality)	N/Av
Iron	N/Av	30,000 mg/kg	N/Av
Fluorine	93 ppm	N/Ap (gas)	N/Ap (gas)
Calcium	N/Av	> 2000 mg/kg (Read-across)	> 2500 mg/kg (Read-across)
Silicon dioxide	N/Av	> 3160 mg/kg	> 5000 mg/kg
Sulphur	> 9.23 mg/L	> 8437 mg/kg	> 2000 mg/kg (No mortality)
Magnesium	N/Av	> 2000 mg/kg (No mortality) (Read-across)	N/Av
Potassium	N/Av	N/Av	N/Av
Manganese	> 5.14 mg/L (dust) (No mortality)	> 2000 mg/kg (No mortality)	N/Av
Lead	> 5.05 mg/L (dust) (No mortality) (Read-across)	> 2000 mg/kg (No mortality) (Read-across)	> 2000 mg/kg (No mortality) (Read-across)
Chlorine	147 ppm	N/Ap (gas)	N/Ap (gas)
Aluminium oxide	> 2.3 mg/L (dust) (No mortality)	> 2000 mg/kg (No mortality)	N/Av
Carbon	> 64.4 mg/L (dust)	> 2000 mg/kg (No mortality)	N/Av
Chromium	> 5.41 mg/L (dust) (No mortality)	> 3400 mg/kg (No mortality)	N/Av
Copper	> 5.11 mg/L (dust) (No mortality)	> 2500 mg/kg	> 2000 mg/kg
Cadmium	0.01 - 0.0125 mg/L (Cadmium oxide; fumes)	2330 mg/kg	N/Av

Other important toxicological hazards
: None known or reported by the manufacturer.

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity : Harmful to aquatic life with long lasting effects. The product should not be allowed to enter drains, water courses or the soil.

The following tables list individual ingredient ecotoxicity data for fish, daphnia and algae.

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Ecotoxicity data:

Ingredients	CAS No	Toxicity to Fish		
		LC50 / 96h	NOEC / 21 day	M Factor
Flue dust, zinc-refining	69012-63-1	> 100 mg/L (Zebra fish)	No information available.	None.
Zinc	7440-66-6	N/Av	N/Av	None.
Iron	7439-89-6	> 10 000 mg/L (Zebra fish)	N/Av	None.
Fluorine	7782-41-4	N/Av	N/Av	None.
Calcium	7440-70-2	N/Av	N/Av	None.
Silicon dioxide	7631-86-9	N/Av	N/Av	None.
Sulphur	7704-34-9	N/Av	N/Av	None.
Magnesium	7439-95-4	541 mg/L (Fathead minnow) (Read-across)	N/Av	None.
Potassium	7440-09-7	N/Av	N/Av	None.
Manganese	7439-96-5	28 mg/L (Fathead minnow)	N/Av	None.
Lead	7439-92-1	1.17 mg/L (Rainbow trout)	N/Av	None.
Chlorine	7782-50-5	0.05 mg/L (Fathead minnow)	N/Av	10
Aluminium oxide	1344-28-1	> 100 mg/L (Brown trout)	N/Av	None.
Carbon	7440-44-0	> 100 mg/L (Zebra fish)	N/Av	None.
Chromium	7440-47-3	33 - 71.9 mg/L (Guppy)	N/Av	None.
Copper	7440-50-8	N/Av	N/Av	None.
Cadmium	7440-43-9	4.48 mg/L (Channel catfish)	0.0013 mg/L/27 days (Coho salmon)	10

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Ingredients	CAS No	Toxicity to Daphnia		
		EC50 / 48h	NOEC / 21 day	M Factor
Flue dust, zinc-refining	69012-63-1	> 100 mg/L (Daphnia magna)	No information available.	None.
Zinc	7440-66-6	0.07 mg/L (Daphnia magna)	0.12 mg/L/29-day	10
Iron	7439-89-6	> 100 mg/L (Daphnia magna)	5.9 mg/L	None.
Fluorine	7782-41-4	N/Av	N/Av	None.
Calcium	7440-70-2	N/Av	N/Av	None.
Silicon dioxide	7631-86-9	N/Av	N/Av	None.
Sulphur	7704-34-9	N/Av	N/Av	None.
Magnesium	7439-95-4	140 mg/L (Daphnia magna) (Read-across)	N/Av	None.
Potassium	7440-09-7	N/Av	N/Av	None.
Manganese	7439-96-5	40 mg/L (Daphnia magna)	N/Av	None.
Lead	7439-92-1	0.45 mg/L (Daphnia magna)	N/Av	None.
Chlorine	7782-50-5	0.085 mg/L (Daphnia magna)	N/Av	10
Aluminium oxide	1344-28-1	> 100 mg/L (Daphnia magna)	N/Av	None.
Carbon	7440-44-0	> 100 mg/L (Daphnia magna)	N/Av	None.
Chromium	7440-47-3	N/Av	N/Av	None.
Copper	7440-50-8	N/Av	N/Av	None.
Cadmium	7440-43-9	0.042 mg/L Daphnia pulex (Water flea)	0.0063 mg/L/28-day Mysidopsis bahia (water flea)	10

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Ingredients	CAS No	Toxicity to Algae		
		EC50 / 96h or 72h	NOEC / 96h or 72h	M Factor
Flue dust, zinc-refining	69012-63-1	12.3 mg/L/72hr	No information available.	None.
Zinc	7440-66-6	0.15 mg/L/72hr (Green algae)	0.05 mg/L/72hr	1
Iron	7439-89-6	N/Av	N/Av	None.
Fluorine	7782-41-4	N/Av	N/Av	None.
Calcium	7440-70-2	N/Av	N/Av	None.
Silicon dioxide	7631-86-9	N/Av	N/Av	None.
Sulphur	7704-34-9	N/Av	N/Av	None.
Magnesium	7439-95-4	> 12 mg/L/72hr (Green algae) (Read-across)	≥ 12 mg/L/72hr (Read-across)	None.
Potassium	7440-09-7	N/Av	N/Av	None.
Manganese	7439-96-5	4.5 mg/L/72hr (Green algae)	2.5 mg/L/72hr	None.
Lead	7439-92-1	2.66 mg/L/96hr (Green algae)	N/Av	None.
Chlorine	7782-50-5	N/Av	N/Av	None.
Aluminium oxide	1344-28-1	> 100 mg/L/72hr (Green algae) (Read-across)	N/Av	None.
Carbon	7440-44-0	> 100 mg/L/72hr (Green algae)	≥ 100 mg/L/72hr	None.
Chromium	7440-47-3	N/Av	N/Av	None.
Copper	7440-50-8	N/Av	N/Av	None.
Cadmium	7440-43-9	0.07 mg/L/72hr (Green algae)	N/Av	10

Persistence and degradability

: Biodegradation is not applicable to metals/inorganic substances.

Bioaccumulation potential : Zinc is a natural, essential element, which is needed for the optimal growth and development of all living organisms, including man. All living organisms have homeostasis mechanisms that actively regulate zinc uptake and absorption/excretion from the body; due to this regulation, zinc and zinc compounds do not bioaccumulate or biomagnify.

Components	Partition coefficient n-octanol/water (log Kow)	Bioconcentration factor (BCF)
Manganese (CAS 7439-96-5)	N/Av	220 (Bluegill sunfish)

Mobility in soil : For metals, the transport and distribution over the different environmental compartments e. g. the water (dissolved fraction, fraction bound to suspended matter), soil (fraction bound or complexed to the soil particles, fraction in the soil pore water...) is described and quantified by the metal partition coefficients between these different fractions. In the CSR, a solids-water partitioning coefficient of 158.5 l/kg (log value 2.2) was applied for zinc in soils (CSR zinc 2010).

Other Adverse Environmental effects

: No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

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SECTION 13. DISPOSAL CONSIDERATIONS

Handling for Disposal : Collect and reclaim or dispose in sealed containers at licensed waste disposal site. This material and its container must be disposed of as hazardous waste. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container.

Methods of Disposal : Dispose in accordance with all applicable federal, state, provincial and local regulations.

RCRA : If this product, as supplied, becomes a waste in the United States, it may meet the criteria of a hazardous waste as defined under RCRA, Title 40 CFR 261. It is the responsibility of the waste generator to determine the proper waste identification and disposal method. For disposal of unused or waste material, check with local, state and federal environmental agencies.

SECTION 14. TRANSPORT INFORMATION

Regulatory Information	UN Number	UN proper shipping name	Transport hazard class(es)	Packing Group	Label
49CFR/DOT	NA3077	Other regulated substances, solid, n.o.s. (Zinc; Lead)	9	III	
49CFR/DOT Additional information	May be shipped as Limited Quantity when transported in containers no larger than 5.0 kg; in packages not exceeding 30 kg gross mass. RQ should be added before the shipping name. Refer to Section 15 for information on Reportable Quantities (RQ's) for ingredients. This product may be shipped as non-regulated material when transported in containers with a capacity of < 1429 lbs (648 kg). No RQ's are exceeded at this quantity.				
TDG	None.	Not regulated.	not regulated	none	
TDG Additional information	None.				
ICAO/IATA	None.	Not regulated.	not regulated	none	
ICAO/IATA Additional information	None.				
IMDG	None.	Not regulated.	not regulated	none	
IMDG Additional information	None.				

Special precautions for user : Avoid and control operations which create dust. Avoid release to the environment.

Environmental hazards : Although this product does not meet the criteria for an environmentally hazardous mixture, according to the IMDG Code, this product does contain substances toxic for the environment. Harmful to aquatic life with long lasting effects. See ECOLOGICAL INFORMATION, Section 12.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

: This information is not available.

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SECTION 15 - REGULATORY INFORMATION

US Federal Information:

Components listed below are present on the following U.S. Federal chemical lists:

Ingredients	CAS #	TSCA Inventory	CERCLA Reportable Quantity(RQ) (40 CFR 117.302):	SARA TITLE III: Sec. 302, Extremely Hazardous Substance, 40 CFR 355:	SARA TITLE III: Sec. 313, 40 CFR 372, Specific Toxic Chemical	
					Toxic Chemical	de minimus Concentration
Flue dust, zinc-refining	69012-63-1	Yes	None.	None.	No	N/Ap
Zinc	7440-66-6	Yes	1000 lbs/454 kg	None.	Yes	0.1%
Iron	7439-89-6	Yes	None.	None.	No	N/Ap
Fluorine	7782-41-4	Yes	10 lb/ 4.54 kg	500 lb TPQ	Yes	0.1%
Calcium	7440-70-2	Yes	None.	None.	No	N/Ap
Silicon dioxide	7631-86-9	Yes	None.	None.	No	N/Ap
Sulphur	7704-34-9	Yes	None.	None.	No	N/Ap
Magnesium	7439-95-4	Yes	None.	None.	No	N/Ap
Potassium	7440-09-7	Yes	None.	None.	No	N/Ap
Manganese	7439-96-5	Yes	None.	None.	Yes	0.1%
Lead	7439-92-1	Yes	10 lbs / 4.54 kg	None.	Yes	0.1%
Chlorine	7782-50-5	Yes	10 lb/ 4.54 kg	100 lb TPQ	Yes	0.1%
Aluminium oxide	1344-28-1	Yes	None.	None.	Yes	0.1%
Carbon	7440-44-0	Yes	None.	None.	No	N/Ap
Chromium	7440-47-3	Yes	5000 lbs / 2270 kg	None.	Yes	0.1%
Copper	7440-50-8	Yes	5000 lbs / 2270 kg	None.	Yes	0.1%
Cadmium	7440-43-9	Yes	10 lbs / 4.54 kg	None.	Yes	0.1%

SARA TITLE III: Sec. 311 and 312, SDS Requirements, 40 CFR 370 Hazard Classes:
Health hazards (Skin irritation; Eye Damage; Germ cell mutagenicity; Carcinogenicity; Reproductive toxicity; Specific target organ toxicity, repeated exposure)

Under SARA Sections 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

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US State Right to Know Laws:

The following chemicals are specifically listed by individual States:

Ingredients	CAS #	California Proposition 65		State "Right to Know" Lists					
		Listed	Type of Toxicity	CA	MA	MN	NJ	PA	RI
Flue dust, zinc-refining	69012-63-1	No	N/Ap	No	No	No	No	No	No
Zinc	7440-66-6	No	N/Ap	Yes	Yes	No	Yes	Yes	Yes
Iron	7439-89-6	No	N/Ap	Yes	No	No	No	No	No
Fluorine	7782-41-4	No	N/Ap	Yes	Yes	Yes	Yes	Yes	Yes
Calcium	7440-70-2	No	N/Ap	Yes	Yes	No	Yes	Yes	Yes
Silicon dioxide	7631-86-9	No	N/Ap	Yes	Yes	Yes	No	Yes	No
Sulphur	7704-34-9	No	N/Ap	Yes	Yes	No	Yes	Yes	Yes
Magnesium	7439-95-4	No	N/Ap	Yes	Yes	No	Yes	Yes	Yes
Potassium	7440-09-7	No	N/Ap	Yes	Yes	No	Yes	Yes	Yes
Manganese	7439-96-5	No	N/Ap	Yes	Yes	Yes	Yes	Yes	Yes
Lead	7439-92-1	Yes	Cancer Developmental male reproductive toxicity female reproductive toxicity	Yes	Yes	Yes	Yes	Yes	No
Chlorine	7782-50-5	No	N/Ap	Yes	Yes	Yes	Yes	Yes	Yes
Aluminium oxide	1344-28-1	No	N/Ap	Yes	Yes	Yes	Yes	Yes	Yes
Carbon	7440-44-0	No	N/Ap	No	No	No	No	No	Yes
Chromium	7440-47-3	No	N/Ap	Yes	Yes	Yes	Yes	Yes	Yes
Copper	7440-50-8	No	N/Ap	Yes	Yes	Yes	Yes	Yes	Yes
Cadmium	7440-43-9	Yes	Cancer Developmental male reproductive toxicity	Yes	Yes	Yes	Yes	Yes	Yes

Canadian Information:

Canadian Environmental Protection Act (CEPA) information: All ingredients listed appear on or are exempt from the Domestic Substances List (DSL).

Canadian National Pollutant Release Inventory (NPRI): This product contains the following substances listed on the NPRI:
Zinc (Part 1, Group A Substance)
Fluorine (Part 1, Group A Substance)
Manganese (Part 1, Group A Substance)
Lead (Part 1, Group B Substance)
Chlorine (Part 1, Group A Substance)
aluminum oxide (Part 1, Group A Substance)
chromium (Part 1, Group A Substance)
Copper (Part 1, Group A Substance)
Cadmium (Part 1, Group B Substance)

WHMIS information: Refer to Section 2 for a WHMIS Classification for this product.

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International Information:

Components listed below are present on the following International Inventory list:

Ingredients	CAS #	European EINECs	Australia AICS	Philippines PICCS	Japan ENCS	Korea KECI/KECL	China IECSC	New Zealand IOC
Flue dust, zinc-refining	69012-63-1	273-760-6	Present	Not listed	Not listed	Not listed	Not listed	Not listed
Zinc	7440-66-6	231-175-3	Present	Present	Not listed	KE-35518	Present	HSR001478, HSR001477, HSR001301, HSR001475, HSR001476
Iron	7439-89-6	231-096-4	Present	Present	Not listed	KE-21059	Present	May be used as a single component chemical under an appropriate group standard.
Fluorine	7782-41-4	231-954-8	Present	Present	Not listed	KE-16999	Present	May be used as a component in a product covered by a group standard, but is not approved for use as a chemical in its own right.
Calcium	7440-70-2	231-179-5	Present	Present	Not listed	KE-04462	Present	HSR001052
Silicon dioxide	7631-86-9	231-545-4	Present	Present	(1)-548	KE-31032	Present	May be used as a single component chemical under an appropriate group standard.
Sulphur	7704-34-9	231-722-6	Present	Present	Not listed	KE-32688	Present	HSR001284
Magnesium	7439-95-4	231-104-6	Present	Present	Not listed	KE-22673	Present	HSR001470
Potassium	7440-09-7	231-119-8	Present	Present	Not listed	KE-29068	Present	HSR001290
Manganese	7439-96-5	231-105-1	Present	Present	Not listed	KE-22999	Present	HSR003013
Lead	7439-92-1	231-100-4	Present	Present	(1)-527	KE-21887	Present	HSR002809
Chlorine	7782-50-5	231-959-5	Present	Present	Not listed	KE-05486	Present	HSR001058
Aluminium oxide	1344-28-1	215-691-6	Present	Present	(1)-23	KE-01012	Present	May be used as a single component chemical under an appropriate group standard.
Carbon	7440-44-0	231-153-3	Present	Present	Not listed	KE-04671	Present	HSR001271
Chromium	7440-47-3	231-157-5	Present	Present	Not listed	KE-05970	Present	HSR002943
Copper	7440-50-8	231-159-6	Present	Present	Not listed	KE-08896	Present	HSR002948
Cadmium	7440-43-9	231-152-8	Present	Present	Not listed	KE-04397	Present	HSR001530

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SECTION 16. OTHER INFORMATION

Legend :

ACGIH: American Conference of Governmental Industrial Hygienists
AICS: Australian Inventory of Chemical Substances
CA: California
CAS: Chemical Abstract Services
CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR: Code of Federal Regulations
CSA: Canadian Standards Association
DOT: Department of Transportation
EC50: Effective Concentration 50%
EINECS: European Inventory of Existing Commercial chemical Substances
EPA: Environmental Protection Agency
HSDB: Hazardous Substances Data Bank
IARC: International Agency for Research on Cancer
IATA: International Air Transport Association
ICAO: International Civil Aviation Organisation
IECSC: Inventory of Existing Chemical Substances
IMDG: International Maritime Dangerous Goods
Inh: Inhalation
IOC: Inventory of Chemicals
ISHL: Industrial Safety Health Law
KECI: Korean Existing Chemicals Inventory
KECL: Korean Existing Chemicals List
LC: Lethal Concentration
LD: Lethal Dose
MA: Massachusetts
MN: Minnesota
N/Ap: Not Applicable
N/Av: Not Available
NIOSH: National Institute of Occupational Safety and Health
NJ: New Jersey
NOEC: No observable effect concentration
NTP: National Toxicology Program
OECD: Organisation for Economic Co-operation and Development
OSHA: Occupational Safety and Health Administration
PA: Pennsylvania
PEL: Permissible exposure limit
PICCS: Philippine Inventory of Chemicals and Chemical Substances
PNOR: Particulates Not Otherwise Regulated
PNOS: Particles Not Otherwise Specified
PPE: Personal Protective Equipment
RCRA: Resource Conservation and Recovery Act
RI: Rhode Island
RTECS: Registry of Toxic Effects of Chemical Substances
SARA: Superfund Amendments and Reauthorization Act
SCBA: Self-Contained Breathing Apparatus
SDS: Safety Data Sheet
STEL: Short Term Exposure Limit
TDG: Canadian Transportation of Dangerous Goods Act & Regulations
TLV: Threshold Limit Values
TSCA: Toxic Substance Control Act
TWA: Time Weighted Average
WHMIS: Workplace Hazardous Materials Identification System

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References :

1. ACGIH, Threshold Limit Values for Chemical Substances and Physical Agents & Biological Exposure Indices for 2017.
2. International Agency for Research on Cancer Monographs, searched 2017.
3. Canadian Centre for Occupational Health and Safety, CCInfoWeb databases, 2017 (Chempendium, HSDB and RTECs).
4. Material Safety Data Sheets from manufacturer.
5. US EPA Title III List of Lists - March 2015 version.
6. California Proposition 65 List - July 7, 2017 version.
7. OECD - The Global Portal to Information on Chemical Substances - eChemPortal, 2017.

Preparation Date (mm/dd/yyyy)

: 10/23/2017

Other special considerations for handling

: Provide adequate information, instruction and training for operators.

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