

6083

SB 47044

MATERIAL SAFETY DATA SHEET

Innovating Science™
by Aldon Corporation 221 Rochester Street
Avon, NY 14414-0400
"cutting edge science for the classroom" (800) 228-8177

MSDS No.: GG0050
Revision Date: May 1, 2010
Approved by: James A. Bertsch

MSDS No.: GG0050

Section 1 Chemical Product and Company Information

Product GERMANIUM
Synonyms Germanium Metal Powder

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

0 = Minimal	Health	0
1 = Slight	Fire	0
2 = Moderate	Reactivity	0
3 = Serious	Contact	0
4 = Severe		

HMIS *

WARNING!

MAY BE HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. MAY CAUSE IRRITATION.
Keep container in a well-ventilated place. Do not breathe dust. Use with adequate ventilation. Avoid contact with skin, eyes and clothing. Wash thoroughly after handling. Target organs: Kidneys, liver, blood.

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Germanium	7440-56-4	100%	None established. (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Use water spray to keep fire-exposed containers cool. Avoid formation of dust. Dust dispersed in air becomes explosive when exposed to ignition source.

Extinguishing Media: Carbon dioxide, dry chemical, water spray, alcohol foam.

Flash Point: N/A

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Contain spillage, then collect with an electrically protected vacuum cleaner or by wet-sweeping and place in suitable container for disposal according to local regulations. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE PAGE NO. 170)

Section 7 Handling & Storage

FLAMMABLE STORAGE CODE RED

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.

Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.

Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from sources of ignition - No smoking. Use spark-proof tools.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or facemask, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.

Appearance: Grey powder.

Odor: No odor.

pH: N/A

Vapor pressure (mm Hg): N/A

Vapor Density (Air = 1): 5.35 g/ml @ 25°C (77°F)

Evaporation rate (= 1): N/A

Viscosity: N/A

Boiling point: 2830°C (5126°F)

Freezing / Melting point: 937°C (1719°F)

Decomposition temperature: N/A

Solubility: Insoluble.

Specific gravity (H₂O = 1): 5.35 g/cm³

Percent volatile (%): 100%

Molecular formula: Ge

Molecular weight: 72.59

Section 10 Stability & Reactivity

Chemical stability: Stable

Hazardous polymerization: Will not occur.

Conditions to avoid: Stable under normal conditions. Avoid heat, sparks and flames.

Incompatibilities with other materials: Strong oxidizers, halogens.

Hazardous decomposition products: Germanium oxides.

Section 11 Toxicological Information

Effects of overexposure: May cause skin irritation. May be harmful if absorbed through the skin. May cause eye irritation. Material may be irritating to mucous membranes and upper respiratory tract. May be harmful if inhaled. May be harmful if swallowed. To the best of our knowledge, the chemical, physical and toxicological properties have not been thoroughly investigated.

RTECS No.: LY5200000

ORL-RAT LD50: N/A

IVN-MUS ld50: N/A

Section 12 Ecological Information

Do not flush into surface water or sanitary sewer system.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN3089

Shipping name: Metal powders, flammable, n.o.s., (Germanium)

Hazard class: 4.1

Packing group: II

Exceptions: Limited quantity equal to or less than 1 Kg.

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-164-3), DSL-listed, RCRA code D001.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

Innovating Science™
"cutting edge science for the classroom"

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221 Rochester Street
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MSDS No.: MM0022
Revision Date: January 5, 2011
Approved by: James A. Bertsch

MSDS No.: MM0022

Section 1 Chemical Product and Company Information

Product MAGNESIUM METAL TURNINGS

Synonyms N/A

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! FLAMMABLE SOLID!

DANGEROUS WHEN WET. KEEP AWAY FROM IGNITION SOURCES.

May be irritating to skin, eyes and respiratory system. Avoid looking at the intense white flame. Target organs: None known.

0 = Minimal	Health	0
1 = Slight	Fire	2
2 = Moderate	Reactivity	2
3 = Serious	Contact	1
4 = Severe		

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Magnesium	7439-95-4	99.8%	TWA: 10 mg/m ³ (Mg oxide fumes) (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

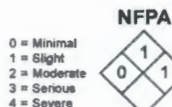
General information: DO NOT use water or foam to extinguish fire. DO NOT use carbon dioxide or halogenated extinguishing agents. Use water spray to keep fire-exposed containers cool. In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Magnesium reacts with water and acids to release hydrogen. Avoid direct viewing of magnesium fires as eye injury may result, use fire glasses. Powders form explosive mixtures with air which may be ignited by a spark.

Extinguishing Media: Use approved Class D extinguisher or smother with dry sand, dry clay or dry ground limestone and dry graphite.

Flash Point: 636°C (1175°F)

Autoignition temperature: 510°C (950°F)

Explosion Limits: Lower: N/A **Upper:** N/A



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Use non-sparking tools. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water after material pickup is complete. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE PAGE NO. 138)

Section 7 Handling & Storage

FLAMMABLE STORAGE CODE RED

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.

Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts or fumes. Wash thoroughly after handling. Remove and wash clothing before reuse.

Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from ignition sources. Protect from water and moisture.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: Silvery gray, metal turnings.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): 1 mm @ 621°C
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A

Boiling point: 1110°C (2030°F)
Freezing / Melting point: 651°C (1202°F)
Decomposition temperature: N/A
Solubility: Negligible.
Specific gravity (H₂O = 1): 1.74 @ 20°C
Percent volatile (%): 99.8%
Molecular formula: Mg
Molecular weight: 24.3

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperatures, heat, sparks, open flame and other sources of ignition.

Incompatibilities with other materials: Magnesium will react with water and acids to release hydrogen. Also hazardous with chlorine, bromine, iodine and oxidizing agents.

Hazardous decomposition products: Hydrogen.

Section 11 Toxicological Information

Effects of overexposure: Exposure to magnesium metal or oxide dust should be a low health risk by inhalation and should be treated as a nuisance dust. Exposure to magnesium oxide fume subsequent to burning can result in metal fume fever. The temporary symptoms can include fever, chills, nausea, vomiting and muscular pain. Onset of symptoms occurs 4-12 hours after exposure. May cause burns and corneal abrasions to the eyes. Particles of magnesium embedded in the skin may produce lesions that resist healing.

ORL-RAT LD50: N/A
IHL-RAT LC50: N/A
SKN-RBT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN1869
Shipping name: Magnesium
Hazard class: 4.1
Packing group: III
Exceptions: Ltd Qty ≤ 5 Kg.

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-104-6), RCRA code D001

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

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MSDS No.: AA0375
Revision Date: February 25, 2010
Approved by: James A. Bertsch

MSDS No.: AA0375

Section 1 Chemical Product and Company Information

Product ANTIMONY METAL LUMPS
Synonyms Antimony Regulus; Stibium

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER!
HAZARDOUS DUST. TOXIC AS FUME. MAY BE HARMFUL IF SWALLOWED.
Avoid contact with skin, eyes and clothing. Use with adequate ventilation.
Store in a cool, dry place. Wash thoroughly after handling.
Target organs: Respiratory and cardiovascular system, liver, kidneys.

0 = Minimal	Health	3
1 = Slight	Fire	1
2 = Moderate	Reactivity	2
3 = Serious	Contact	2
4 = Severe		

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Antimony metal	7440-36-0	100%	TWA: 0.5 mg/m ³ (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General Information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Fire or excessive heat may produce hazardous decomposition products to be produced as dust or fume. Non-combustible solid in bulk form, but a moderate explosion hazard in the form of dust when exposed to flame. Use water spray to keep fire-exposed containers cool. Note: Stibine, which is extremely toxic, is formed when antimony is exposed to nascent (freshly formed) hydrogen.

Extinguishing Media: Sand, dry chemical, or CO₂ should be used on surrounding fire. Do NOT use water on fire where molten metal is present.

Flash Point: Non-flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal	
1 = Slight	
2 = Moderate	
3 = Serious	
4 = Severe	

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage

TOXIC STORAGE CODE BLUE

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale fumes. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from acids or reactive substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: Lustrous, silvery gray.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A

Boiling point: 1750°C (3182°F)
Freezing / Melting point: 630°C (1166°F)
Decomposition temperature: N/A
Solubility: Insoluble in water.
Specific gravity (H₂O = 1): 6.68
Percent volatile (%): N/A
Molecular formula: Sb
Molecular weight: 121.75

Section 10 Stability & Reactivity

Chemical stability: Stable **Hazardous polymerization:** Will not occur.

Conditions to avoid: Excessive temperatures and nascent hydrogen.

Incompatibilities with other materials: Strong oxidizers, acids, halogenated acids [Note: Stibine is formed when antimony is exposed to nascent hydrogen.]

Hazardous decomposition products: Antimony oxides.

Section 11 Toxicological Information

Effects of overexposure: INHALATION: Inflammation of mucous membranes of nose and throat. INGESTION: Stomatitis, vomiting, diarrhea. SKIN: Irritation and eczematous eruption on the skin. EYES: Irritation. Exercise appropriate procedures to minimize potential hazards.

RTECS #: CC4025000
UNKNOWN-MAN: LDLo: 15 mg/kg

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: Not Regulated.
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-146-5), DSL-listed.

Section 16 Additional Information

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MATERIAL SAFETY DATA SHEET

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MSDS No.: BB0130
Revision Date: March 2, 2010
Approved by: James A. Bertsch

MSDS No.: BB0130

Section 1 Chemical Product and Company Information

Product BISMUTH METAL LUMPS
Synonyms N/A

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

LOW HAZARD FOR USUAL LABORATORY HANDLING.

Bismuth metal is of relatively low toxicity and has little or no effect of intact skin or mucous membranes. The metal itself is not particularly hazardous on ingestion.

Store in a cool, dry place. Wash thoroughly after handling.

Target organs: None known.

0 = Minimal	Health	0
1 = Slight	Fire	0
2 = Moderate	Reactivity	1
3 = Serious	Contact	0
4 = Severe		

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Bismuth metal	7440-69-9	100%	None established. (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Fire or excessive heat may produce hazardous decomposition products to be produced as dust or fume. Non-combustible solid in bulk form, but a moderate explosion hazard in the form of dust when exposed to flame. Use water spray to keep fire-exposed containers cool.

Extinguishing Media: Sand, dry chemical, or CO2 should be used on surrounding fire. Do NOT use water on fire where molten metal is present.

Flash Point: Non-flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage

GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale fumes. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from acids or acid fumes.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.

Appearance: Lustrous, silvery gray or reddish.

Odor: No odor.

pH: N/A

Vapor pressure (mm Hg): 1 @ 1021°C

Vapor Density (Air = 1): N/A

Evaporation rate (Butyl acetate = 1): N/A

Viscosity: N/A

Boiling point: 1562°C (2487°F)

Freezing / Melting point: 272°C (521°F)

Decomposition temperature: N/A

Solubility: Insoluble in water.

Specific gravity (H₂O = 1): 9.80 (20/4°C)

Percent volatile (%): N/A

Molecular formula: Bi

Molecular weight: 208.98

Section 10 Stability & Reactivity

Chemical stability: Stable

Hazardous polymerization: Will not occur.

Conditions to avoid: Excessive temperatures and sources of ignition.

Incompatibilities with other materials: Strong oxidizers, acids, ammonium nitrate plus powdered Bismuth may cause violent reaction.

Hazardous decomposition products: Emits toxic fumes on contact with acids. When heated, burns in air to form Bismuth trioxide.

Section 11 Toxicological Information

Effects of overexposure: Bismuth metal is of relatively low toxicity and has little or no effect of intact skin or mucous membranes. The metal itself is not particularly hazardous on ingestion. **EYES AND SKIN:** Prolonged or repeated contact may cause irritation. Exercise appropriate procedures to minimize potential hazards.

ORAL-RAT: LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A

Shipping name: Not Regulated.

Hazard class: N/A

Packing group: N/A

Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-177-4), RCRA code D001, DSL-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

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MSDS No.: CC0014
Revision Date: February 19, 2010
Approved by: James A. Bertsch

MSDS No.: CC0014

Section 1 Chemical Product and Company Information

Product CADMIUM METAL
Synonyms N/A

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

WARNING!

HARMFUL IF INHALED AS FUMES. POISONOUS FUMES MAY BE FORMED ON HEATING. WARNING: This product contains a chemical known to the State of California to cause cancer. Abrasive to skin. Wash thoroughly after handling. Target organs: Lungs, kidneys.

0 = Minimal	Health	3
1 = Slight	Fire	0
2 = Moderate	Reactivity	0
3 = Serious	Contact	1
4 = Severe		

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Cadmium metal	7440-43-9	100%	TWA: 0.01 mg/m ³ (as dust) (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: Use water spray to keep fire-exposed containers cool. In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Molten metals produce fume, vapor and/or dust that may be toxic and/or a respiratory irritant. Metal reacts with oxidizing agents.

Extinguishing Media: Sand, dry chemical, or CO₂ should be used on surrounding fire. Do NOT use water on fire where molten metal is present.

Flash Point: >767°C (1412°F)

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage

TOXIC STORAGE CODE BLUE

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.

Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale fumes. Wash thoroughly after handling. Remove and wash clothing before reuse.

Storage: Store in a cool, dry, well-ventilated area away from incompatible materials.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: Silvery gray, lustrous metal.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A

Boiling point: 767°C (1412°F)
Freezing / Melting point: 320.9°C (610°F)
Decomposition temperature: N/A
Solubility: Insoluble.
Specific gravity (H₂O = 1): 8.642 @ 20°C
Percent volatile (%): N/A
Molecular formula: Cd
Molecular weight: 112.40

Section 10 Stability & Reactivity

Chemical stability: Stable

Hazardous polymerization: Will not occur.

Conditions to avoid: Excessive temperatures above 610°C that may produce fumes.

Incompatibilities with other materials: Cadmium dust can react vigorously with oxidizing agents. Tarnishes in moist air. Contact with Hydrazoic acid may cause explosion. Avoid storage or use near acids or alkaline hydroxides.

Hazardous decomposition products: Heat treatment, welding or soldering of cadmium metal will produce toxic cadmium oxide fumes.

Section 11 Toxicological Information

Effects of overexposure: WARNING: THIS PRODUCT CONTAINS A CHEMICAL KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER. Risk of cancer depends on level and duration of exposure. All cadmium compounds may cause cancer. A single exposure to excessive levels of cadmium fumes or dust can cause severe lung irritation, chest pain and edema which may be fatal. Lower exposure levels may cause dryness of throat, cough, headache, shortness of breath and vomiting. May cause skin irritation and discoloration. May cause mechanical irritation to the eyes. Exercise appropriate procedures to minimize potential hazards.

RTECS #: EU9800000

Oral-rat LD50: 2330 mg/kg Parenteral-rat LD50: 5 mg/kg Intravenous-rabbit LD50: 2.5 mg/kg

Section 12 Ecological Information

Data not yet available. Do not flush into surface water or sanitary sewer system.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A

Shipping name: Not Regulated.

Hazard class: N/A

Packing group: N/A

Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-152-8), RCRA code D006, DSL-listed, Ca Prop 65-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

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Aron, NY 14414-0408
(585) 229-6177

MSDS No.: MM0187
Revision Date: July 5, 2011
Approved by: James A. Bertsch

MSDS No.: MM0187

Section 1 Chemical Product and Company Information

Product MANGANESE METAL, CHIPS

Synonyms N/A

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

WARNING!

HARMFUL IF SWALLOWED OR INHALED. MAY CAUSE IRRITATION TO EYES AND SKIN.

Avoid contact with skin, eyes and clothing. Wash thoroughly after handling. Keep container tightly closed. Store in a cool, dry place. Target organs: Central nervous system.

0 = Minimal	Health	1
1 = Slight	Fire	0
2 = Moderate	Reactivity	0
3 = Serious	Contact	0
4 = Severe		

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Manganese	7439-96-5	100%	TWA: 0.2 mg/m ³ [Manganese and inorganic compounds, as Mn] (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Fire or excessive heat may produce hazardous decomposition products to be produced as dust or fume. Use water spray to keep fire-exposed containers cool.

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

Flash Point: Non-flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A



Section 6 Accidental Release Measures

Evacuate personnel to safe area. Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage

GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.

Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.

Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Avoid exposure to water and moisture.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.

Appearance: Silvery gray, metallic chips.

Odor: No odor.

pH: N/A

Vapor pressure (mm Hg): N/A

Vapor Density (Air = 1): N/A

Evaporation rate (= 1): N/A

Viscosity: N/A

Boiling point: 2095°C (3803°F)

Freezing / Melting point: 2271°C (1244°F)

Decomposition temperature: N/A

Solubility: Insoluble.

Specific gravity (H₂O = 1): N/A

Percent volatile (%): N/A

Molecular formula: Mn

Molecular weight: 54.94

Section 10 Stability & Reactivity

Chemical stability: Stable

Conditions to avoid: Avoid moisture.

Incompatibilities with other materials: Oxidizing agents, reducing agents, hydroxides, cyanides, carbonates.

Hazardous decomposition products: Manganese oxides.

Hazardous polymerization: Will not occur.

Section 11 Toxicological Information

Effects of overexposure: Chronic manganese poisoning primarily involves the central nervous system. Early symptoms include languor, sleepiness and weakness in the legs. A stolid mask-like appearance of the face, emotional disturbances such as uncontrollable laughter and a spastic gait with tendency to fall while walking are findings in more advanced cases. High incidence of pneumonia has been found in workers exposed to the dust or fume of some manganese compounds. Men exposed to manganese dust have showed a decrease in fertility. To the best of our knowledge the chemical, physical and toxicological properties have not been thoroughly investigated. Specific data is not available. Exercise appropriate procedures to minimize potential hazards.

RTECS #: O09625000

Section 12 Ecological Information

EC50 - Daphnia magna (water flea) - 40 mg/l - 48 h

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A

Shipping name: Not Regulated.

Hazard class: N/A

Packing group: N/A

Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-105-1), DSL-listed, WHMIS Classification-D2A [as powder].

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

Innovating Science™ by Aldon Corporation 221 Rochester Street
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 (609) 229-6177

MSDS No.: GG0225
 Revision Date: February 22, 2010
 Approved by: James A. Bertsch

MSDS No.: GG0225

Section 1 Chemical Product and Company Information

Product GRAPHITE POWDER

Synonyms Natural graphite; Carbon, Black Lead

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

CAUTION!

DO NOT BREATHE DUST.

Use with adequate ventilation. Avoid contact with skin, eyes and clothing.

Target organs: None known.

0 = Minimal	Health	1
1 = Slight	Fire	0
2 = Moderate	Reactivity	0
3 = Serious	Contact	1
4 = Severe		

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Graphite powder	7782-42-5	100%	TWA: 2 mg/m ³ Respirable fraction (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Graphite is a conductor of electricity. Use caution when handling in areas where contact with electrical circuitry is possible.

Extinguishing Media: Carbon dioxide, dry chemical, water spray, alcohol foam.

Flash Point: Non-volatile solid.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage

GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.

Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.

Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from ignition sources.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or face shield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.

Appearance: Black powder.

Odor: No odor.

pH: N/A

Vapor pressure (mm Hg): N/A

Vapor Density (Air = 1): N/A

Evaporation rate (= 1): N/A

Viscosity: N/A

Boiling point: N/A

Freezing / Melting point: Decomposes.

Decomposition temperature: N/A

Solubility in water: Insoluble.

Specific gravity (H₂O = 1): 2.20-2.35

Percent volatile (%): N/A

Molecular formula: C

Molecular weight: 12.01

Section 10 Stability & Reactivity

Chemical stability: Stable

Hazardous polymerization: Will not occur.

Conditions to avoid: Stable under normal and fire conditions.

Incompatibilities with other materials: Strong oxidizers.

Hazardous decomposition products: Oxides of carbon.

Section 11 Toxicological Information

Effects of overexposure: May cause skin irritation. May cause eye irritation. Material may be irritating to mucous membranes and upper respiratory tract. May be harmful if inhaled. May be harmful if swallowed. To the best of our knowledge, the chemical, physical and toxicological properties have not been thoroughly investigated.

RTECS No.: MD9659600

ORL-RAT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A

Shipping name: Not Regulated.

Hazard class: N/A

Packing group: N/A

Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-955-3), DSL-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

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Avon, NY 14414-0409
(888) 225-6177

MSDS No.: CC0260
Revision Date: February 19, 2010
Approved by: James A. Bertsch

MSDS No.: CC0260

Section 1 Chemical Product and Company Information

Product CHARCOAL, WOOD POWDER
Synonyms N/A

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

WARNING!

DO NOT USE FOR INDOOR HEATING OR COOKING UNLESS VENTILATION IS PROVIDED FOR EXHAUSTING FUMES TO THE OUTSIDE.

Toxic carbon monoxide released during burning. Use with adequate ventilation. Do not breathe dust. Avoid contact with skin, eyes and clothing. Target organs: None known.

0 = Minimal	Health	0
1 = Slight	Fire	1
2 = Moderate	Reactivity	0
3 = Serious	Contact	0
4 = Severe	HMIS *	

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Charcoal	7440-44-0	100%	TWA: 15 mg/m ³ total dust 8 hour (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Dust dispersed in air becomes explosive when exposed to ignition source.

Extinguishing Media: Carbon dioxide, dry chemical, water spray, alcohol foam.

Flash Point: Combustible.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



None listed.

Section 7 Handling & Storage

FLAMMABLE STORAGE CODE RED

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.

Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.

Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from ignition sources.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.

Appearance: Black powder.

Odor: No odor.

pH: 6.0 - 9.0

Vapor pressure (mm Hg): Negligible.

Vapor Density (Air = 1): N/A

Evaporation rate (= 1): N/A

Viscosity: N/A

Boiling point: Decomposes.

Freezing / Melting point: 3652-3697°C (6606-6687°F)

Decomposition temperature: 450°C (842°F)

Solubility: Insoluble.

Specific gravity (H₂O = 1): 1.8-2.1

Percent volatile (%): 100%

Molecular formula: C

Molecular weight: 12.01

Section 10 Stability & Reactivity

Chemical stability: Stable

Hazardous polymerization: Will not occur.

Conditions to avoid: Stable under normal and fire conditions.

Incompatibilities with other materials: Strong oxidizers.

Hazardous decomposition products: Oxides of carbon.

Section 11 Toxicological Information

Effects of overexposure: May cause skin irritation. May be harmful if absorbed through the skin. May cause eye irritation. Material may be irritating to mucous membranes and upper respiratory tract. May be harmful if inhaled. May be harmful if swallowed. To the best of our knowledge, the chemical, physical and toxicological properties have not been thoroughly investigated.

RTECS No.: FF5250100

ORL-RAT LD50: N/A

IVN-MUS LD50: 440 mg/kg

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: NA1361

Shipping name: Charcoal

Hazard class: 4.2

Packing group: III

Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed. EINECS-listed (231-153-3)

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

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(585) 226-6177

MSDS No.: CC0285
Revision Date: February 19, 2010
Approved by: James A. Bertsch

MSDS No.: CC0285

Section 1 Chemical Product and Company Information

Product CHROMIUM METAL

Synonyms Chromium; Chrome

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

CAUTION!

TOXIC BY INHALATION OF DUST OR FUME.

Suspect cancer hazard. Avoid contact with skin, eyes and clothing. Use with adequate ventilation. Store in a cool, dry place. Wash thoroughly after handling.

Target organs: Lungs, kidneys.

0 = Minimal	Health	0
1 = Slight	Fire	0
2 = Moderate	Reactivity	0
3 = Serious	Contact	0
4 = Severe		

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Chromium metal	7440-47-3	100%	TWA: 0.5 mg/m ³ dust or fume

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Fire or excessive heat may produce hazardous decomposition products to be produced as dust or fume. Dusts may form flammable and explosive mixtures in air. Use water spray to keep fire-exposed containers cool.

Extinguishing Media: Dry chemical, sand or carbon dioxide.

Flash Point: Not flammable.

Autoignition temperature: 400°C (752°F) as dust

Explosion Limits: Lower: N/A Upper: N/A



Section 6 Accidental Release Measures

Evacuate personnel to safe area. Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage

GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.

Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.

Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from ignition sources.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.

Appearance: Gray metal chunks or pieces.

Odor: No odor.

pH: N/A

Vapor pressure (mm Hg): N/A

Vapor Density (Air = 1): N/A

Evaporation rate (Butyl acetate = 1): N/A

Viscosity: N/A

Boiling point: 2200°C (3992°F)

Freezing / Melting point: 1830°C (3326°F)

Decomposition temperature: N/A

Solubility in water: Insoluble.

Specific gravity (H₂O = 1): 7.20 @ 20°C

Percent volatile (%): N/A

Molecular formula: Cr

Molecular weight: 52.00

Section 10 Stability & Reactivity

Chemical stability: Stable

Hazardous polymerization: Will not occur.

Conditions to avoid: Avoid generation of airborne dusts. Excessive temperatures and heat.

Incompatibilities with other materials: Attacked by caustic alkalies and alkali carbonates, acids and strong oxidizers.

Hazardous decomposition products: Chromium fume.

Section 11 Toxicological Information

Effects of overexposure: **WARNING: THIS PRODUCT CONTAINS A CHEMICAL KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.** Risk of cancer depends on level and duration of exposure. All chromium compounds may cause cancer. Overexposure to dust may irritate eyes, nose and throat. Prolonged inhalation of dust may cause pulmonary disease. Chromium pieces or flake may contain sharp edges, therefore, caution is advised in handling. Exercise appropriate procedures to minimize potential hazards.

RTECS #: GB4200000

UNREPORTED ROUTE -RAT LD50: 27,500 µg/kg

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A

Shipping name: Not Regulated.

Hazard class: N/A

Packing group: N/A

Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-157-5), RCRA code D007, DSL-listed, Ca Prop 65-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

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MSDS No.: CC0345
Revision Date: February 19, 2010
Approved by: James A. Bertsch

MSDS No.: CC0345

Section 1 Chemical Product and Company Information

Product COBALT METAL
Synonyms Cobalt

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

WARNING!

MAY BE HARMFUL IF SWALLOWED OR INHALED AS DUST OR FUME. WARNING: This product contains a chemical known to the State of California to cause cancer. Harmful fumes may be formed on heating. Use with adequate ventilation. Wash thoroughly after handling. Target organs: Lungs.

0 = Minimal	Health	1
1 = Slight	Fire	0
2 = Moderate	Reactivity	0
3 = Serious	Contact	1
4 = Severe		

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Cobalt metal	7440-48-4	100%	TWA: 0.02 mg/m ³ (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: Use water spray to keep fire-exposed containers cool. In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Molten metals produce fume, vapor and/or dust that may be toxic and/or a respiratory irritant. Metal reacts with oxidizing agents. Fine powder forms flammable and explosive mixtures in air. Material in powder form capable of creating a dust explosion.

Extinguishing Media: Sand, dry chemical, or CO₂ should be used on surrounding fire. Do NOT use water on fire where molten metal is present.

Flash Point: N/A

Autoignition temperature: >200°C (392°F)

Explosion Limits: Lower: N/A **Upper:** N/A

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

NFPA



None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage

GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children. **Handling:** Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale fumes. Wash thoroughly after handling. Remove and wash clothing before reuse. **Storage:** Store in a cool, dry, well-ventilated area away from incompatible materials.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: Gray, magnetic pieces.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): Negligible.
Vapor Density (Air = 1): N/A
Evaporation rate (= 1): N/A
Viscosity: N/A

Boiling point: 2723°C (3550°F)
Freezing / Melting point: 1493°C (2720°F)
Decomposition temperature: N/A
Solubility: Insoluble.
Specific gravity (H₂O = 1): 8.9 g/cc
Percent volatile (%): N/A
Molecular formula: Co
Molecular weight: 58.93

Section 10 Stability & Reactivity

Chemical stability: Stable

Hazardous polymerization: Will not occur.

Conditions to avoid: Excessive temperatures.

Incompatibilities with other materials: Strong acids, strong oxidizers, acetylene, hydrazinium nitrate, ammonium nitrate, bromine pentafluoride.

Hazardous decomposition products: Metallic oxides.

Section 11 Toxicological Information

Effects of overexposure: Suspect cancer hazard. **INHALATION:** Inhalation may cause pulmonary symptoms and irritation of respiratory tract. **SKIN:** Powder may cause dermatitis. Possibility of allergic skin reaction. **EYES:** Contact with eyes may cause serious irritation. IARC classified: Group 2B: Possibly carcinogenic to humans. Risk of cancer depends on level and duration of exposure. Exercise appropriate procedures to minimize potential hazards.

RTECS #: GF8750000

Section 12 Ecological Information

Data not yet available. Do not flush into surface water or sanitary sewer system.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A

Shipping name: Not Regulated.

Hazard class: N/A

Packing group: N/A

Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-158-0), RCRA code D001, DSL-listed, Ca Prop 65-listed, WHMIS Classification-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

Innovating Science™
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 (888) 228-6177

MSDS No.: CC0413
 Revision Date: February 19, 2010
 Approved by: James A. Bertsch

MSDS No.: CC0413

Section 1 Chemical Product and Company Information

Product COPPER METAL POWDER
Synonyms N/A

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Copper	7440-50-8	100%	TWA: 1.0 mg/m ³ dusts and mists as Cu TWA: 0.2 mg/m ³ fume (ACGIH 2001)

Section 3 Hazards Identification

Emergency Overview

CAUTION!

DO NOT BREATHE METAL DUST.

May be harmful if swallowed. Harmful if inhaled as dust or fume. May cause irritation to skin and eyes. Avoid contact with Nitric acid, emits toxic fumes of nitrogen oxides. Target organs: Liver, kidneys.

0 = Minimal	Health	0
1 = Slight	Flre	0
2 = Moderate ^P	Reactivity	0
3 = Serious	Contact	0
4 = Severe		

HMIS *

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Non-flammable and non-combustible solid, but air-bom dust may ignite. Do not use water to fight fires involving this material.

Extinguishing Media: Use triclass, dry chemical fire extinguisher.

Flash Point: Non-combustible.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A Upper: N/A



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage

GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.

Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dust. Wash thoroughly after handling. Remove and wash clothing before reuse.

Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from ignition sources.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None needed in normal laboratory handling. If dusty conditions prevail, work in a ventilation hood or wear a NIOSH/MSHA-approved dust mask.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: Reddish-brown, lustrous metal.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): 1 mm @ 1628°C
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A

Boiling point: 2595°C (4703°F)
Freezing / Melting point: 1083°C (1981°F)
Decomposition temperature: N/A
Solubility: Insoluble.
Specific gravity (H₂O = 1): 8.92 @ 20°C
Percent volatile (%): N/A
Molecular formula: Cu
Molecular weight: 63.55

Section 10 Stability & Reactivity

Chemical stability: Stable

Hazardous polymerization: Will not occur.

Conditions to avoid: Excessive temperatures, heat, sparks, open flame and other sources of ignition. Acids.

Incompatibilities with other materials: Strong acids, oxidizers, alkalies, bromates, chlorates, iodates, sodium azide, acetyline and halogens.

Hazardous decomposition products: Nitrogen oxide is reacted with nitric acid.

Section 11 Toxicological Information

Effects of overexposure: Inhalation of this material can cause intense sneezing, nausea, vomiting, weakness and metal fume fever. Ingestion of this material may cause moderate irritation to the stomach lining. If product gets into eyes, corneal abrasions may occur. May cause irritation on contact with skin. Repeated or prolonged exposure may cause liver and kidney damage, with an increased risk with Wilson's disease.

ORL-RAT LD50: N/A
 RTECS #: GL5325000

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of cataloq-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: Not Regulated.
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-159-6), RCRA code D001, Ca Prop 65-Not listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

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MSDS No.: BB0003
 Revision Date: March 2, 2010
 Approved by: James A. Bertsch

MSDS No.: BB0003

Section 1 Chemical Product and Company Information

Product BARIUM METAL RODS
Synonyms N/A

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! FLAMMABLE SOLID!
 DANGEROUS WHEN WET. AVOID CONTACT WITH SKIN AND EYES.
 Store under argon or paraffin oil in airtight container. Protect from moisture and air.
 Avoid contact with skin, eyes and clothing. Store in a cool, dry place. Wash thoroughly after handling. Target organs: Central nervous system, kidneys.

0 = Minimal	Health	1
1 = Slight	Fire	3
2 = Moderate	Reactivity	2
3 = Serious	Contact	1
4 = Severe		

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Barium metal	7440-39-3	100%	TWA: 0.5 mg/m ³ as Barium and compounds (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

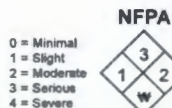
General information: DO NOT use water or foam to extinguish fire. DO NOT use carbon dioxide or halogenated extinguishing agents. Use water spray to keep fire-exposed containers cool. In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Reaction with water produces explosive hydrogen gas and enough heat to ignite gas/air mixture plus toxic and corrosive Barium hydroxide solution.

Extinguishing Media: Use approved Class D extinguisher or smother with dry sand, dry clay or dry ground limestone and dry graphite.

Flash Point: Flammable solid.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A Upper: N/A



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Use non-sparking tools. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water after material pickup is complete. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE PAGE NO. 138)

Section 7 Handling & Storage

FLAMMABLE STORAGE CODE RED

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.

Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale fumes. Wash thoroughly after handling. Remove and wash clothing before reuse.

Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from ignition sources. Avoid exposure to water and moisture.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: Lustrous, silvery gray.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A

Boiling point: 1695°C (3085°F)
Freezing / Melting point: 850°C (1562°F)
Decomposition temperature: N/A
Solubility in water: Reacts violently.
Specific gravity (H₂O = 1): 3.74
Percent volatile (%): N/A
Molecular formula: Ba
Molecular weight: 137.34

Section 10 Stability & Reactivity

Chemical stability: Stable

Hazardous polymerization: Will not occur.

Conditions to avoid: Excessive temperatures and other sources of ignition. Avoid contact with water.

Incompatibilities with other materials: Water, acids, oxidizers, chlorinated and fluorinated hydrocarbons such as CCl₄.

Hazardous decomposition products: Hydrogen (explosive), barium hydroxide solution (caustic/toxic).

Section 11 Toxicological Information

Effects of overexposure: Caustic burns of skin, eyes and mucous membranes. Corneal damage and blindness may result. Moderately toxic via oral exposure route. Exercise appropriate procedures to minimize potential hazards.

RTECS #: CQ8370000

ORAL-RAT: LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN1400

Shipping name: Barium

Hazard class: 4.3

Packing group: II

Exceptions: Ltd Qty ≤ 0.5 Kg (1.1 lb)

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-149-1), DSL-listed.

Section 16 Additional Information

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MATERIAL SAFETY DATA SHEET

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(866) 226-6177

MSDS No.: SS0159
Revision Date: November 5, 2010
Approved by: James A. Bertsch

MSDS No.: SS0159

Section 1 Chemical Product and Company Information

Product SILVER METAL
Synonyms Silver

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

CAUTION!
MAY BE HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN.

Avoid contact with skin, eyes and clothing. Use with adequate ventilation. Store in a cool, dry place. Wash thoroughly after handling. Target organs: None known.

0 = Minimal	Health	1
1 = Slight	Fire	2
2 = Moderate	Reactivity	1
3 = Serious	Contact	2
4 = Severe		

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Silver metal	7440-22-4	100%	TWA: 0.1 mg/m ³ (air) (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General Information: Use water spray to keep fire-exposed containers cool. In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Molten metals produce fume, vapor and/or dust that may be toxic and/or a respiratory irritant. Metal reacts with oxidizing agents. Fire powder forms flammable and explosive mixtures in air. Material in powder form capable of creating a dust explosion.

Extinguishing Media: Sand, dry chemical, or CO₂ should be used on surrounding fire. Do NOT use water on fire where molten metal is present.

Flash Point: N/A

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A



Section 6 Accidental Release Measures

Evacuate personnel to safe area. Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage

GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.

Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale fumes. Wash thoroughly after handling. Remove and wash clothing before reuse.

Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.

Appearance: Silvery gray, powder.

Odor: No odor.

pH: N/A

Vapor pressure (mm Hg): N/A

Vapor Density (Air = 1): N/A as solid.

Evaporation rate (= 1): N/A

Viscosity: N/A

Boiling point: 2212°C (4014°F)

Freezing / Melting point: 962°C (1764°F)

Decomposition temperature: N/A

Solubility: Insoluble.

Specific gravity (H₂O = 1): 10.5

Percent volatile (%): N/A

Molecular formula: Ag

Molecular weight: 107.87

Section 10 Stability & Reactivity

Chemical stability: Stable

Hazardous polymerization: Will not occur.

Conditions to avoid: Excessive temperatures and heat.

Incompatibilities with other materials: Acetylene, ammonia and hydrogen peroxide, nitric acid, ethylene imine, chlorine trifluoride, inorganic and organic peroxides, peroxyformic acid, bromoazide, oxalic acid, 1-bromo-2-propyne, tartaric acid, permonosulfuric acid, sulfuric acid.

Hazardous decomposition products: At temperatures above melting point, silver oxide fume may be evolved.

Section 11 Toxicological Information

Effects of overexposure: Silver metal as dust or fume presents a health hazard. Generalized argyria may result from silver ingestion. Exercise appropriate procedures to minimize potential hazards.

RTECS #: VW3500000

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A

Shipping name: Not Regulated.

Hazard class: N/A

Packing group: N/A

Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-131-3), DSL-listed, WHMIS-Uncontrolled product.

Section 16 Additional Information

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MATERIAL SAFETY DATA SHEET

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MSDS No.: CC0036
Revision Date: February 19, 2010
Approved by: James A. Bertsch

MSDS No.: CC0036

Section 1 Chemical Product and Company Information

Product	CALCIUM METAL
Synonyms	N/A

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! FLAMMABLE SOLID! DANGEROUS WHEN WET!
Reacts violently and/or explosively with water, steam or moisture to liberate hydrogen. Can be explosive when exposed to heat or flame. Causes severe irritation to the eyes, skin and mucous membrane with possible burns. Target organs: None known.

0 = Minimal	Health	1
1 = Slight	Fire	2
2 = Moderate	Reactivity	2
3 = Serious	Contact	1
4 = Severe		

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Calcium	7440-70-2	98% T	None established. (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

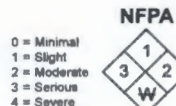
General information: DO NOT use water or foam to extinguish fire. DO NOT use carbon dioxide or halogenated extinguishing agents. Use water spray to keep fire-exposed containers cool. In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Calcium reacts with water and acids to release hydrogen. Heat of reaction may ignite evolved hydrogen. Avoid direct viewing of calcium fires as eye injury may result, use fire glasses. Powders form explosive mixtures with air which may be ignited by a spark.

Extinguishing Media: Use approved Class D extinguisher or smother with dry sand, dry clay or dry ground limestone and dry graphite.

Flash Point: N/A

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Use non-sparking tools. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water after material pickup is complete. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE PAGE NO. 138)

Section 7 Handling & Storage

FLAMMABLE STORAGE CODE RED

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dust. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from ignition sources. Avoid exposure to water and moisture.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Personnel should wear safety glasses, goggles, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If misty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: Silvery gray metal.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): 10 mm Hg @ 983°C
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A

Boiling point: 1440°C (4755°F)
Freezing / Melting point: 842°C (1542°F)
Decomposition temperature: N/A
Solubility: Reacts violently with water.
Specific gravity (H₂O = 1): 1.54
Percent volatile (%): 98%
Molecular formula: Ca
Molecular weight: 40.08

Section 10 Stability & Reactivity

Chemical stability: Stable
Conditions to avoid: Excessive temperatures, heat, sparks, open flame and other sources of ignition. Avoid contact with air and water. Avoid dispersion of dust in air.

Incompatibilities with other materials: Acids, halogens, alkali, metals, hydroxides, carbonates. Calcium will react with water and acids to release hydrogen.

Hazardous decomposition products: Hydrogen, calcium hydroxide, calcium oxide.

Section 11 Toxicological Information

Effects of overexposure: This product is severely irritating to the eyes and may cause burns. Irritating to the skin. If ingested, product may produce gastrointestinal tract irritation and disturbances. If inhaled, dusts may cause irritation of the nose, throat, and respiratory tract. If this material contact moisture in the eyes, on the skin, or in the respiratory tract, severe irritation and corrosion of tissue may result.

ORL-RAT LD50: N/A
IHL-RAT LC50: N/A
SKN-RBT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN1401
Shipping name: Calcium
Hazard class: 4.3
Packing group: II
Exceptions: Ltd Qty ≤ (0.5 Kg) 1.1 lb.

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-179-5), RCRA code D001, D0003

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

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(609) 225-6177

MSDS No.: AA0145
Revision Date: January 26, 2010
Approved by: James A. Bertsch

MSDS No.: AA0145

Section 1 Chemical Product and Company Information

Product ALUMINUM METAL
Synonyms N/A

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	0
Fire	1
Reactivity	1
Contact	0

HMIS *

CAUTION!
INHALATION AS FUME MAY CAUSE IRRITATION.
Store away from acids, alkalies and oxidizers.
Target organs: None known.

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Aluminum	7429-90-5	> 99.5%	TWA: 10 mg/m ³ (Al metal dust) (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: Use water spray to keep fire-exposed containers cool. In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Molten metals produce fume, vapor and/or dust that may be toxic and/or a respiratory irritant. Metal reacts with oxidizing agents. Reacts with some acids and caustic solutions to produce hydrogen. Molten aluminum may explode on contact with water. It may also react violently with rust, certain metal oxides (e.g. oxides of copper, iron and lead) and nitrates (e.g. ammonium nitrate and fertilizers containing ammonium nitrate).

Extinguishing Media: Sand, dry chemical, or CO₂ should be used on surrounding fire. Do NOT use water on fire where molten metal is present.

Flash Point: N/A

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Wet-sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water after material pickup is complete. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage

GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.

Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale fumes. Wash thoroughly after handling. Remove and wash clothing before reuse.

Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: Use a chemical fume hood and/or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.

Appearance: Silvery gray, spherical metal pieces.

Odor: No odor.

pH: N/A

Vapor pressure (mm Hg): N/A

Vapor Density (Air = 1): 0.095 - 0.113 lb/in³

Evaporation rate (Butyl acetate = 1): N/A

Viscosity: N/A

Boiling point: N/A

Freezing / Melting point: 660°C (1220°F)

Decomposition temperature: N/A

Solubility: Insoluble.

Specific gravity (H₂O = 1): N/A

Percent volatile (%): N/A

Molecular formula: Al

Molecular weight: 26.98

Section 10 Stability & Reactivity

Chemical stability: Stable

Hazardous polymerization: Will not occur.

Conditions to avoid: Excessive temperatures and heat.

Incompatibilities with other materials: Strong oxidizers, mineral acids, strong alkalies, halogenated hydrocarbons, and water.

Hazardous decomposition products: Reacts with water (in molten form), acids or alkalies to generate hydrogen gas.

Section 11 Toxicological Information

Effects of overexposure: May cause irritation. It has been reported that chronic exposure has been suspected of causing lung injury. To the best of our knowledge, the chemical, physical and toxicological properties have not been thoroughly investigated. Specific data is not available. Exercise appropriate procedures to minimize potential hazards.

ORL-RAT LD50: N/A

IHL-RAT LC50: N/A

SKN-RBT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A

Shipping name: Not Regulated.

Hazard class: N/A

Packing group: N/A

Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-072-3)

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

Innovating Science™
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 Avon, NY 14414-8409
 (585) 228-6177

MSDS No.: IX0209
 Revision Date: March 1, 2010
 Approved by: James A. Bertsch

MSDS No.: IX0209

Section 1 Chemical Product and Company Information

Product IRON METAL FILINGS, DEGREASED
Synonyms Iron Aggregate

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Iron aggregate	65997-19-5	100%	
Contains:			
Iron	1309-37-1	>90%	TWA: 5 mg/m ³
Carbon	7440-44-0	<4.0%	N/A
Silicon	7440-21-3	<3.0%	TWA: 10 mg/m ³
Manganese	7439-96-5	<0.3-1.0%	TWA: 0.2 mg/m ³
Chromium	7440-47-3	<0.0-0.2%	TWA: 0.5 mg/m ³ (metal and Cr III compounds)

(ACGIH 2001)

Section 3 Hazards Identification

Emergency Overview

CAUTION!

Iron dust dispersed in air may constitute a fire and/or explosion hazard. Iron dust may cause irritation and/or inflammation of the skin, eyes, mucous membranes and lungs.
 Target organs: None known.

0 = Minimal	Health	1
1 = Slight	Fire	0
2 = Moderate	Reactivity	1
3 = Serious	Contact	1
4 = Severe	HMIS *	

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General Information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Use water spray to keep fire-exposed containers cool. A fire hazard in the form of a fine dust dispersed in air or by chemical reaction with strong oxidizers can be an explosion hazard, especially when heated.

Extinguishing Media: Use dry chemical, dry sand or graphite for extinguishing fire.

Flash Point: N/A

Autoignition temperature: N/A

Explosion Limits: Lower: N/A Upper: N/A



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage

GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.

Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dust. Wash thoroughly after handling. Remove and wash clothing before reuse.

Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from ignition sources.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None needed in normal laboratory handling. If dusty conditions prevail, work in a ventilation hood or wear a NIOSH/MSHA-approved dust mask.

Section 9 Physical & Chemical Properties

Physical state: Solid.

Appearance: Grey particles.

Odor: No odor.

pH: N/A

Vapor pressure (mm Hg): N/A

Vapor Density (Air = 1): N/A

Evaporation rate (Butyl acetate = 1): N/A

Viscosity: N/A

Boiling point: N/A

Freezing / Melting point: 1508.49°C (2750°F)

Decomposition temperature: N/A

Solubility: Insoluble.

Specific gravity (H₂O = 1): 6.7 gm/cc

Percent volatile (%): N/A

Molecular formula: Mixture.

Molecular weight: Mixture.

Section 10 Stability & Reactivity

Chemical stability: Stable

Hazardous polymerization: Will not occur.

Conditions to avoid: Excessive temperatures, heat, sparks, open flame and other sources of ignition. Acids.

Incompatibilities with other materials: Strong oxidizers, organic acids, mineral acids, water.

Hazardous decomposition products: None.

Section 11 Toxicological Information

Effects of overexposure: Iron dust is an eye, skin and mucous membrane irritant. May cause irritation and inflammation of the eyes and lungs. Exercise appropriate procedures to minimize potential hazards.

ORL-RAT LD50: 30 gm/kg

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A

Shipping name: Not Regulated.

Hazard class: N/A

Packing group: N/A

Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-096-4), RCRA code D001, Ca Prop 65-Not listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

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(888) 226-6177

MSDS No.: LL0085
Revision Date: February 11, 2010
Approved by: James A. Bertsch

MSDS No.: LL0085

Section 1 Chemical Product and Company Information

Product LEAD METAL
Synonyms N/A

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

CAUTION!
MAY BE HARMFUL OR FATAL IF SWALLOWED OR INHALED AS DUST OR FUME. Suspect cancer hazard. Store away from incompatible materials. Target organs: Lungs, kidneys.

0 = Minimal	Health	3
1 = Slight	Fire	0
2 = Moderate	Reactivity	0
3 = Serious	Contact	1
4 = Severe		

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Lead metal	7439-92-1	99+%	TWA: 0.05 mg/m ³ (Lead and inorganic compounds as Pb) (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: Use water spray to keep fire-exposed containers cool. In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Molten metals produce fume, vapor and/or dust that may be toxic and/or a respiratory irritant. Metal reacts with oxidizing agents. Molten aluminum may explode on contact with water.

Extinguishing Media: Sand, dry chemical, or CO₂ should be used on surrounding fire. Do NOT use water on fire where molten metal is present.

Flash Point: N/A

Autoignition temperature: N/A

Explosion Limits: Lower: N/A Upper: N/A



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Wet-sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water after material pickup is complete. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage

GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale fumes. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: Silvery gray, metallic shots.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A

Boiling point: 1753°C (3187°F)
Freezing / Melting point: 327°C (621°F)
Decomposition temperature: N/A
Solubility: Insoluble.
Specific gravity (H₂O = 1): 11.34 (20/4°C)
Percent volatile (%): N/A
Molecular formula: Pb
Molecular weight: 207.19

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.

Conditions to avoid: Excessive temperatures and heat.

Incompatibilities with other materials: Strong oxidizers, hydrogen peroxide, acids.

Hazardous decomposition products: Emits toxic fumes of lead.

Section 11 Toxicological Information

Effects of overexposure: **WARNING: THIS PRODUCT CONTAINS A CHEMICAL KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.** Risk of cancer depends on level and duration of exposure. Sheets have sharp edges and may cause cuts or scratches. Not absorbed through skin. Contact with eyes may cause transient irritation. Ingestion may cause anorexia, vomiting, malaise, convulsions due to increased intracranial pressure. Inhalation of dust or fumes can cause lead poisoning. Exercise appropriate procedures to minimize potential hazards.

RTECS #: OF7525000

Intraperitoneal-rabbit: Lowest published toxic dose: 50 mg/kg

Oral-woman: Lowest published toxic dose: 450 mg/kg/6 year

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A

Shipping name: Not Regulated.

Hazard class: N/A

Packing group: N/A

Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-100-4), RCRA code D008, DSL-listed, Ca Prop 65-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

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 (585) 226-6177

MSDS No.: TT0290
 Revision Date: November 5, 2010
 Approved by: James A. Bertsch

MSDS No.: TT0290

Section 1 Chemical Product and Company Information

Product TUNGSTEN METAL
Synonyms Wolfram

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

WARNING!

MODERATE FIRE HAZARD IN THE FORM OF DUST WHEN EXPOSED TO FLAME.

Avoid contact with skin, eyes and clothing. Use with adequate ventilation. Store in a cool, dry place. Wash thoroughly after handling. Target organs: None known.

0 = Minimal	Health	1
1 = Slight	Fire	2
2 = Moderate	Reactivity	0
3 = Serious	Contact	1
4 = Severe		

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Tungsten metal	7440-33-7	100%	TWA: 5 mg/m ³ (as Tungsten metal and insoluble compounds) (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Non-flammable and non-combustible solid, but air-borne dust may ignite. Molten metals produce fume, vapor and/or dust that may be toxic and/or respiratory irritants. In contact with acids, emits hydrogen gas. Do not use water to fight fires involving this material.

Extinguishing Media: Use triclass, dry chemical fire extinguisher. Do not use water.

Flash Point: Non-flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

0 = Minimal
 1 = Slight
 2 = Moderate
 3 = Serious
 4 = Severe

NFPA



None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage

GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dust. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or face shield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None needed in normal laboratory handling. If dusty conditions prevail, work in a ventilation hood or wear a NIOSH/MSHA-approved dust mask.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: Silvery, metallic powder.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (= 1): N/A
Viscosity: N/A

Boiling point: 5660°C (10220°F)
Freezing / Melting point: 3410°C (6170°F)
Decomposition temperature: N/A
Solubility: Insoluble.
Specific gravity (H₂O = 1): 19.3
Percent volatile (%): N/A
Molecular formula: W
Molecular weight: 183.85

Section 10 Stability & Reactivity

Chemical stability: Stable

Hazardous polymerization: Will not occur.

Conditions to avoid: Avoid dispersion of dust in air.

Incompatibilities with other materials: Ignites on contact with fluorine gas at room temperature. Contact with acids may generate flammable hydrogen gas. Avoid contact with strong oxidizers.

Hazardous decomposition products: None known.

Section 11 Toxicological Information

Effects of overexposure: Material may be irritating to mucous membranes and upper respiratory tract. If product gets into eyes, corneal abrasions may occur. May cause abrasions on contact with skin. To the best of our knowledge, the chemical, physical and toxicological properties have not been thoroughly investigated. Specific data is not available. Exercise appropriate procedures to minimize potential hazards.

RECS No: YO7175000

ORL-RAT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: Not Regulated.
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-143-9), DSL-listed, WHMIS Classification-Uncontrolled product.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

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(609) 226-6177

MSDS No.: NN0100
Revision Date: November 19, 2010
Approved by: James A. Bertsch

MSDS No.: NN0100

Section 1 Chemical Product and Company Information

Product NICKEL METAL, SHOT
Synonyms N/A

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

WARNING!

HARMFUL AS DUST OR FUME. MAY CAUSE SKIN IRRITATION.
WARNING: This product contains a chemical known to the State of California to cause cancer. Wash thoroughly after handling.
Target organs: None known.

0 = Minimal	Health	3
1 = Slight	Fire	0
2 = Moderate	Reactivity	0
3 = Serious	Contact	1
4 = Severe		

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Nickel metal	7440-02-0	100%	TWA: 1 mg/m ³ (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

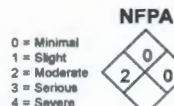
General information: Use water spray to keep fire-exposed containers cool. In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Molten metals produce fume, vapor and/or dust that may be toxic and/or a respiratory irritant. Metal reacts with oxidizing agents. Reacts with some acids and caustic solutions to produce hydrogen.

Extinguishing Media: Sand, dry chemical, or CO₂ should be used on surrounding fire. Do NOT use water on fire where molten metal is present.

Flash Point: Flammable as dust.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage

GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale fumes. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from acids or reactive substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: Silvery gray, metal foil.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): 1 mm @ 1810°C
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A

Boiling point: 2732°C (4950°F)
Freezing / Melting point: 1452°C (2645°F)
Decomposition temperature: N/A
Solubility: Insoluble.
Specific gravity (H₂O = 1): 8.90 @ 20°C
Percent volatile (%): N/A
Molecular formula: Ni
Molecular weight: 58.71

Section 10 Stability & Reactivity

Chemical stability: Stable
Conditions to avoid: Excessive temperatures and heat. Storage near mineral acids.

Hazardous polymerization: Will not occur.

Incompatibilities with other materials: Ammonium nitrate, perchlorates, phosphorus, selenium, sulfur. Slowly attacked by dilute hydrochloric acid or sulfuric acid. Readily attacked by nitric acid.

Hazardous decomposition products: Reacts with mineral acids to generate hydrogen. Evolved hydrogen may become an explosion hazard. Heating nickel metal emits nickel dust or fumes.

Section 11 Toxicological Information

Effects of overexposure: Risk of cancer depends on level and duration of exposure. IARC classified: Group 2B: Possibly carcinogenic to humans. May cause dermatitis in sensitive individuals. May cause sensitization by skin contact. To the best of our knowledge the chemical, physical and toxicological properties have not been thoroughly investigated. Specific data is not available. Exercise appropriate procedures to minimize potential hazards.

RTECS #: QR5950000

ORL-RAT Lowest published lethal dose: 500 mg/kg

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: Not Regulated.
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-111-4), RCRA code D001, D003, DSL-listed, Ca Prop 65-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

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MSDS No.: SS0151
 Revision Date: December 27, 2010
 Approved by: James A. Bertsch

MSDS No.: SS0151

Section 1 Chemical Product and Company Information

Product SILICON METAL LUMPS
Synonyms Silicon Metal

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

0 = Minimal	Health	0
1 = Slight	Fire	0
2 = Moderate	Reactivity	0
3 = Serious	Contact	0
4 = Severe	HMIS *	

CAUTION!

IRRITANT AS DUST. DO NOT INHALE AS DUST OR FUME.
 Low hazard in the form of lumps. Wash thoroughly after handling.
 Target organs: None known.

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Silicon metal lumps	7440-21-3	100%	TWA: 10 mg/m ³ for total dust containing no asbestos and less than 1% crystalline silica; STEL: 20 mg/m ³ as dust

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. No associated hazards known at this time.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.

Flash Point: Not flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A Upper: N/A



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage

GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.

Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.

Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.

Appearance: Metallic silver lumps.

Odor: No odor.

pH: N/A

Vapor pressure (mm Hg): N/A

Vapor Density (Air = 1): N/A

Evaporation rate (Butyl acetate = 1): N/A

Viscosity: N/A

Boiling point: N/A

Freezing / Melting point: 1440°C (2594°F)

Decomposition temperature: N/A

Solubility: Complete.

Specific gravity (H₂O = 1): 2.3

Percent volatile (%): N/A

Molecular formula: Si

Molecular weight: 28.09

Section 10 Stability & Reactivity

Chemical stability: Stable

Hazardous polymerization: Will not occur.

Conditions to avoid: Avoid generation of airborne dust.

Incompatibilities with other materials: Acids and strong bases.

Hazardous decomposition products: None known.

Section 11 Toxicological Information

Effects of overexposure: Inhalation of dust may cause irritation to lungs, eyes and mucous membranes. Low hazard in the form of lumps. Exercise appropriate procedures to minimize potential hazards.

RTECS #: VV0400000

ORAL-RAT LD50: 3160 mg/kg

EYE-RABBIT: 3 mg/mild

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A

Shipping name: Not Regulated.

Hazard class: N/A

Packing group: N/A

Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-130-8), RCRA code D001, DSL-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

Innovating Science™
 "cutting edge science for the classroom"
by Aldon Corporation 221 Rochester Street
 Arden, NY 14414-8408
 (585) 226-8177

MSDS No.: SS1085
 Revision Date: August 8, 2010
 Approved by: James A. Bertsch

MSDS No.: SS1085

Section 1 Chemical Product and Company Information

Product SULFUR
Synonyms Sulfur Flower; Sulfur Flour

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

WARNING! FLAMMABLE SOLID!

BURNING SULFUR EMITS HIGHLY TOXIC FUMES. SULFUR DUST SUSPENDED IN AIR IGNITES EASILY. MAY CAUSE ALLERGIC REACTION. Sulfur reacts explosively with strong oxidizing agents such as nitrates and chlorates. It will also react at moderate rates with alkalis. Keep away from heat, sparks and open flame. Avoid breathing dust. Use with adequate ventilation. Target organs: None known.

0 = Minimal
 1 = Slight
 2 = Moderate
 3 = Serious
 4 = Severe

Health	1
Fire	1
Reactivity	0
Contact	1

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Sulfur	7704-34-9	100%	TWA: 10 mg/m ³ (total dust) TWA: 5 mg/m ³ (respirable dust)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Fires involving a small amount of combustibles may be smothered by dry chemical. Easily ignitable, combustible solid. Dust or vapor fumes form explosive mixtures with air. Hazardous in contact with oxidizing materials, forming explosive mixtures.

Extinguishing Media: Use water fog.

Flash Point: 207°C (405°F) Closed Cup

Autoignition temperature: 248°C (478°F)

Explosion Limits: Lower: 3.3% **Upper:** 46.0%

0 = Minimal
 1 = Slight
 2 = Moderate
 3 = Serious
 4 = Severe

NFPA



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Avoid creating dust. Use non-sparking tools. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage

FLAMMABLE STORAGE CODE RED

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.

Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.

Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from ignition sources.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or face shield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.

Appearance: Yellow powder, crystals or broken lumps.

Odor: Faint odor of rotten eggs.

pH: N/A

Vapor pressure (mm Hg): 0 @ 138°C (280°F)

Vapor Density (Air = 1): N/A

Evaporation rate (Butyl acetate = 1): N/A

Viscosity: N/A

Boiling point: 444°C (831°F)

Freezing / Melting point: 116-121°C (242-251°F)

Decomposition temperature: N/A

Solubility: Insoluble.

Specific gravity (H₂O = 1): 2.04-2.07 @ 21°C (70°F)

Percent volatile (%): Negligible.

Molecular formula: S

Molecular weight: 32.06

Section 10 Stability & Reactivity

Chemical stability: Stable

Hazardous polymerization: Will not occur.

Conditions to avoid: Excessive temperatures, heat, sparks, open flame and other sources of ignition.

Incompatibilities with other materials: Reacts violently with strong oxidizing agents. Corrosive to copper and copper alloys. Damp sulfur will corrode steel.

Hazardous decomposition products: Sulfur dioxide.

Section 11 Toxicological Information

Effects of overexposure: Sulfur is essentially non-toxic either through ingestion, inhalation or skin contact.

There are, however, some individuals who may be allergic and must not be permitted in the area of exposure. Sulfur is an eye irritant, but if prompt treatment is applied no lasting injury will result.

ORL-RAT LD50: 5 g/kg

EYE-HMN LC50: 8 ppm

SKN-RBT LD50: N/A

Section 12 Ecological Information

Aquatic toxicity: TLm96: 1000 ppm

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: NA1350

Shipping name: Sulfur

Hazard class: 9

Packing group: III

Exceptions: No exceptions.

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-722-6)

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

Innovating Science™ by Aldon Corporation 221 Rochester Street
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 (888) 228-6177

MSDS No.: TT0175
 Revision Date: January 25, 2010
 Approved by: James A. Bertsch

MSDS No.: TT0175

Section 1 Chemical Product and Company Information

Product TIN METAL
Synonyms N/A

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Tin metal	7440-31-5	99.85%	TWA: 2 mg/m ³ (air) (ACGIH 2001)

Section 3 Hazards Identification

Emergency Overview

CAUTION!

HARMFUL IF INHALED AS DUST OR FUME. SHARP EDGES. USE CARE WHEN HANDLING.

May cause irritation to skin and eyes. Avoid contact with acids or acid fumes. Target organs: None known.

0 = Minimal	Health	0
1 = Slight	Fire	0
2 = Moderate	Reactivity	0
3 = Serious	Contact	1
4 = Severe		

HMIS *

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Non-flammable and non-combustible solid, but air-bom dust may ignite. Molten metals produce fume, vapor and/or dust that may be toxic and/or respiratory irritants. In contact with acids, emits hydrogen gas. This gas is flammable and can cause explosion. Do not use water to fight fires involving this material.

Extinguishing Media: Use triclass, dry chemical fire extinguisher. Do not use water.

Flash Point: Non-flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage

GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dust. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None needed in normal laboratory handling. If dusty conditions prevail, work in a ventilation hood or wear a NIOSH/MSHA-approved dust mask.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: Silvery, metallic.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): 1 mm @ 1492°C
Vapor Density (Air = 1): 4.11
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A

Boiling point: 2270°C (4118°F)
Freezing / Melting point: 231.9°C (449°F)
Decomposition temperature: N/A
Solubility: Insoluble.
Specific gravity (H₂O = 1): 7.31 @ 20°C
Percent volatile (%): N/A
Molecular formula: Sn
Molecular weight: 118.69

Section 10 Stability & Reactivity

Chemical stability: Stable **Hazardous polymerization:** Will not occur.

Conditions to avoid: Contact with acids.

Incompatibilities with other materials: Strong oxidizers, chlorine, cupric nitrate, potassium, sodium peroxide, sulfur, halogens, sulfuric chlorosulfuric and pyrosulfuric acid.

Hazardous decomposition products: Oxides of tin may be present. Reacts with acids, causing evolution of flammable hydrogen gas.

Section 11 Toxicological Information

Effects of overexposure: Material may be irritating to mucous membranes and upper respiratory tract. If product gets into eyes, corneal abrasions may occur. May cause abrasions on contact with skin. To the best of our knowledge, the chemical, physical and toxicological properties have not been thoroughly investigated. Specific data is not available. Exercise appropriate procedures to minimize potential hazards.

RTECS No: XP7320000

ORL-RAT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: Not Regulated.
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-141-8), RCRA code D001

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

Innovating Science™ by Aldon Corporation 221 Rochester Street
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MSDS No.: ZZ0015
 Revision Date: January 30, 2010
 Approved by: James A. Bertsch

MSDS No.: ZZ0015

Section 1 Chemical Product and Company Information

Product ZINC METAL
Synonyms N/A

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

CAUTION!

USE CARE IN HANDLING. ABRASIVE TO SKIN.

Reacts with acids to liberate hydrogen gas, a flammable and explosive gas. Store away from heat, open flames, acids and acid fumes. In case of fire, smother with sand. Dust clouds may be explosive. Target organs: None known.

0 = Minimal	Health	0
1 = Slight	Fire	1
2 = Moderate	Reactivity	2
3 = Serious	Contact	0
4 = Severe	HMIS *	

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Zinc metal	7440-66-6	99%	None established. (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: Use water spray to keep fire-exposed containers cool. In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Metal reacts with oxidizing agents. Powders form explosive mixtures with air which may be ignited by a spark. Reacts with some acids and caustic solutions to produce hydrogen, an explosive condition may exist if this happens in confined spaces.

Extinguishing Media: Sand, dry chemical, or CO2 should be used on surrounding fire. Do NOT use water where molten metal is present.

Flash Point: Non-flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Use non-sparking tools. Wet-sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water after material pickup is complete. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage

GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.

Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.

Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Avoid exposure to water and moisture.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.

Appearance: Silvery gray, metallic.

Odor: No odor.

pH: N/A

Vapor pressure (mm Hg): N/A

Vapor Density (Air = 1): N/A

Evaporation rate (Butyl acetate = 1): N/A

Viscosity: N/A

Boiling point: 907°C (1665°F)

Freezing / Melting point: 419°C (787°F)

Decomposition temperature: N/A

Solubility: Insoluble.

Specific gravity (H₂O = 1): 7.12

Percent volatile (%): N/A

Molecular formula: Zn

Molecular weight: 65.38

Section 10 Stability & Reactivity

Chemical stability: Stable

Hazardous polymerization: Will not occur.

Conditions to avoid: Excessive temperatures and heat. Hydrogen may evolve when in contact with water or damp air.

Incompatibilities with other materials: Strong oxidizers, acids, alkalis, and water.

Hazardous decomposition products: Zinc oxides and zinc fumes. Reacts with water, acids or alkalis to generate hydrogen gas.

Section 11 Toxicological Information

Effects of overexposure: When heated above 400°C (752°F), inhalation of the fumes may lead to metal fume fever. Mild to severe symptoms of chills and fever, profuse perspiration, weakness, nausea, vomiting and coughing can occur. Contact with eyes may cause irritation. Prolonged or repeated skin contact may cause skin irritation. Exercise appropriate procedures to minimize potential hazards.

ORL-RAT LD50: N/A

IHL-RAT LC50: N/A

SKN-RBT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A

Shipping name: Not Regulated.

Hazard class: N/A

Packing group: N/A

Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-175-3), DSL-listed.

Section 16 Additional Information

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