

**REDUCTION METAL
SAFETY DATA SHEET**

SECTION 1. IDENTIFICATION

Product Identity: Reduction Metal Alloy

Trade Names and Synonyms: 405 Alloy, 405 Metal, Lead No. 405.

Manufacturer:
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Product Use: Used in the production of antimony-arsenic-lead alloys.

SECTION 2. HAZARDS IDENTIFICATION

CLASSIFICATION:

Health	Physical	Environmental
Acute Toxicity (Oral, Inhalation) – Does not meet criteria Skin Corrosion/Irritation – Does not meet criteria Eye Damage/Eye Irritation – Does not meet criteria Respiratory or Skin Sensitization – Does not meet criteria Mutagenicity – Category 2 Carcinogenicity – Category 1A Reproductive Toxicity – Category 1A Specific Target Organ Toxicity Acute Exposure – Does not meet criteria Chronic Exposure – Category 1	Does not meet criteria for any Physical Hazard	Aquatic Toxicity – Short Term (Acute) Category 2

LABEL:

Symbols: 	Signal Word: DANGER
Hazard Statements DANGER! Causes damage to kidneys, blood-forming systems, central nervous system and digestive tract through prolonged or repeated exposure. May cause cancer. May damage the unborn child. May cause harm to breast-fed children. Suspected of damaging fertility. Suspected of causing genetic defects. Toxic to aquatic life.	Precautionary Statements: Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves/protective clothing/eye protection. Do not breathe dust or fumes. Wash hands thoroughly after handling. Do not eat, drink or smoke when using this product. If exposed or concerned or you feel unwell: Get medical advice/attention. Avoid release to the environment.

Emergency Overview: A bluish-white to silvery-grey heavy, soft metal that does not burn in bulk. Clouds of finely-divided dust are a moderate fire and explosion hazard, however. When heated strongly in air, highly toxic lead, arsenic and antimony fumes can be generated. Inhalation or ingestion of dust or fumes may produce both acute and chronic health effects. Possible cancer and reproductive hazard. Highly toxic ARSINE and STIBINE gas may be generated if these alloys contact strong acids or bases

in the presence of an active metal such as zinc or galvanized steel. **Such circumstances should be regarded as being immediately life threatening.** SCBA and full protective clothing are required for fire emergency response personnel.

Potential Health Effects: Inhalation or ingestion of dust or fumes may result in nausea, vomiting, abdominal pain, dryness and irritation of the nose and throat, coughing, metallic taste, headache, fatigue, sleep disturbances, weight loss, anemia and leg, arm, and joint pain. Prolonged exposure may also cause central nervous system damage, gastrointestinal and hematological changes, dermatitis and other skin effects, kidney and liver dysfunction and possible reproductive effects. Pregnant women, in particular, should be protected from excessive exposure in order to prevent absorbed lead crossing the placental barrier and causing infant neurological disorders. Due to the presence of arsenic and lead, which are classified as carcinogens or possible carcinogens by various regulatory and advisory bodies, this product is considered carcinogenic (see Toxicological Information, Section 11).

Potential Environmental Effects: Since this product is a metal alloy, its constituents likely having low water solubility, and hence, low bioavailability, it has low potential for immediate environmental harm. However, longer-term exposure in the terrestrial and aquatic environments may lead to the release of some compound forms of lead, antimony and arsenic that may be potentially toxic to organisms in these environments.

SECTION 3. COMPOSITION / INFORMATION ON INGREDIENTS

HAZARDOUS COMPONENTS	CAS Registry No.	CONCENTRATION (% wgt/wgt)
Lead	7439-92-1	60 – 82%
Antimony	7440-36-0	10 – 25%
Arsenic	7440-38-2	4 – 14%

Note: see Section 8 for Occupational Exposure Guidelines.

SECTION 4. FIRST AID MEASURES

Eye Contact: *Symptoms:* Irritation, redness. Gently brush product off face if necessary. Do not rub eye(s). Let the eye(s) water naturally for a few minutes. Look right and left, then up and down. If particle/dust does not dislodge, cautiously rinse eye(s) with lukewarm, gently flowing water for 5 minutes or until particle/dust is removed, while holding eyelid(s) open. If irritation persists, get medical advice/attention. DO NOT attempt to manually remove anything stuck to the eye.

Skin Contact: *Symptoms:* Skin soiling, mild irritation. Gently brush away excess dust. Wash gently and thoroughly with lukewarm, gently flowing water and non-abrasive soap for 5 minutes, or until product is removed. If skin irritation occurs or you feel unwell, get medical advice/attention. *Molten Metal:* Flush contact area to solidify and cool but do not attempt to remove encrusted material or clothing. Cover burns and seek medical attention immediately.

Inhalation: *Symptoms:* Irritation of nose and throat, coughing. Remove source of exposure or move person to fresh air and keep comfortable for breathing. Seek medical attention if you feel unwell.

Ingestion: *Symptoms:* Nausea, vomiting, abdominal pain. If you feel unwell or are concerned, get medical advice/attention.

SECTION 5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Massive metal is not flammable or combustible. Finely-divided alloy dust or powder is a moderate fire hazard and a moderate explosion hazard when dispersed in the air at high concentrations and exposed to heat, flame or other sources of ignition. Explosions may also occur upon contact with certain incompatible materials (see Stability and Reactivity, Section 10).

Extinguishing Media: Use any means of extinction appropriate for surrounding fire conditions such as water spray, carbon dioxide, dry chemical, or foam. Do not use direct water streams on fires where molten metal is present.

Fire Fighting: Do not use direct water streams on fires where molten metal is present, due to the risk of a *steam explosion* that could potentially eject molten metal uncontrollably. Use a fine water mist on the front-running edge of the spill and on the top of the molten metal to cool and solidify it. If possible, move material from fire area and cool material exposed to flame. Highly toxic fumes of lead, arsenic, and antimony oxides may evolve in fires. Fire fighters must be fully trained and wear full protective clothing including an approved, self-contained breathing apparatus which supplies a positive air pressure within a full face piece mask.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Procedures for Cleanup: Control source of spillage if possible to do so safely. Restrict access to the area until completion of clean-up. Clean up spilled material immediately, observing precautions in Section 8, Personal Protection. Molten metal should be allowed to solidify before cleanup. Once solidified, wear gloves, pick up and return to process. If present as dust, wear recommended personal protective equipment (see Section 8) and use methods that will minimize dust generation (e.g. vacuum solids). Return uncontaminated spilled material to the process if possible. Place contaminated material in suitable labelled containers for later recovery or disposal. Treat or dispose of waste material in accordance with all local, regional, and national requirements.

Personal Precautions: Persons responding to an accidental release should wear protective clothing, gloves and a respirator (see also Section 8). Close-fitting safety goggles may be necessary in some circumstances to prevent eye contact with dust and fume. Where molten metal is involved, wear heat-resistant gloves and suitable clothing for protection from radiant energy and hot metal splash as well as a respirator to protect against inhalation of fumes. Workers should wash and change clothing following cleanup of a spill to prevent personal contamination.

Environmental Precautions: Although this product is not an immediate threat to the environment, care in handling, storage, transport and use is required to prevent environmental contamination. Material in aquatic and terrestrial environments may be chemically altered to release toxic compounds.

SECTION 7. HANDLING AND STORAGE

Store reduction metal pigs or billets in DRY, covered areas, separate from strong acids, other incompatible materials, active metals and foods or feedstuffs. Ingots suspected of containing moisture should be THOROUGHLY DRIED before being added to a molten bath. Otherwise, entrained moisture could expand explosively and spatter molten metal out of the bath. Always practice good personal hygiene. Refrain from eating, drinking, or smoking in work areas. Thoroughly wash hands at the end of the workday as well as before any eating, drinking, or smoking in appropriate, designated areas. No special packaging materials are required. NOTE: Special care should be taken in processing reduction metal alloys to minimize the risk of generating arsine and stibine gases. Installation of devices for detection of these gases is recommended in areas where there is a recognized potential for generation. Lead metal, in contact with wood or other surfaces, may leave traces of lead particulate that can accumulate over time. Cleaning or disposal of these surfaces requires review to ensure that any effluent or solid waste disposal meets the requirements of regulations in the applicable jurisdiction.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Occupational Exposure Guidelines: (*Time-Weighted Average (TWA) concentration over 8 hr. unless otherwise indicated*)

<u>Component</u>	<u>ACGIH TLV</u>	<u>OSHA PEL</u>	<u>NIOSH REL</u>
Lead	0.05 mg/m ³	0.05 mg/m ³	0.05 mg/m ³
Antimony	0.5 mg/m ³	0.5 mg/m ³	0.5 mg/m ³
Arsenic	0.01 mg/m ³	0.01 mg/m ³	0.002 mg/m ³ (Ceiling)

NOTE: OEGs for individual jurisdictions may differ from those given above. Check with local authorities for the applicable OEGs in your jurisdiction.

ACGIH - American Conference of Governmental Industrial Hygienists; OSHA - Occupational Safety and Health Administration; NIOSH - National Institute for Occupational Safety and Health. TLV – Threshold Limit Value, PEL – Permissible Exposure Limit, REL – Recommended Exposure Limit.

NOTE: The selection of the necessary level of engineering controls and personal protective equipment will vary depending upon the conditions of use and the potential for exposure. The following are therefore only general guidelines that may not fit all circumstances. Control measures to consider include:

Ventilation: Use adequate local or general ventilation to maintain the concentration of lead, arsenic and antimony fumes in the working environment well below their respective occupational exposure limits. Supply sufficient replacement air to make up for air removed by the exhaust system. Local exhaust is recommended for melting, casting, welding, grinding and flame cutting or burning.

Protective Clothing: Gloves and coveralls or other work clothing are recommended to prevent prolonged or repeated direct skin contact when this alloy is processed. Appropriate eye protection should be worn where fume or dust is generated. Where hot or molten metal is handled, heat resistant gloves, goggles or face shield, and clothing to protect from radiant heat and hot metal splash should be worn. Safety type boots are recommended.

Contaminated clothing should be changed frequently and laundered before each reuse. If using a commercial or industrial laundry service, inform laundry personnel of contaminants' hazards. Workers should not take dirty work clothes home and launder them with other personal clothing. A double locker-shower system with separate clean and dirty sides is usually required for lead handling operations.

Respirators: Where reduction metal dust or fumes are generated and cannot be controlled to within acceptable levels by engineering means, use appropriate NIOSH-approved respiratory protection equipment (a 42CFR84 Class N, R or P-100 particulate filter cartridge). When exposure levels are obviously high but the actual concentration is unknown, a self-contained breathing apparatus which supplies a positive air pressure within a full face piece mask should be worn.

General Hygiene Considerations: Do not eat, drink or smoke in work areas. Thoroughly wash hands at the end of the work shift as well as before eating, drinking, or smoking in appropriate, designated areas.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Bluish-white to silvery-grey	Odour: None	Odour Threshold: None	pH: Not Applicable
Vapour Pressure: Negligible @ 25°C	Vapour Density: Not Applicable	Melting Point/Range: 250 – 300°C	Boiling Point/Range: No Data
Relative Density (Water = 1): 10.1 – 10.2	Evaporation Rate: Not Applicable	Coefficient of Water/Oil Distribution: Not Applicable	Solubility: Insoluble in water
Flash Point: None	Flammable Limits (LEL/UEL): Not Applicable	Auto-ignition Temperature: None	Decomposition Temperature: None

SECTION 10. STABILITY AND REACTIVITY

Stability & Reactivity: This material is stable and not considered reactive under normal temperatures and pressures. Hazardous polymerization or runaway reactions will not occur.

Incompatibilities: Lead-antimony-arsenic alloys react vigorously with strong acids or bases, strong oxidizing agents, such as peroxides, chlorates, nitrates, and halogens or interhalogen compounds such as chlorine trifluoride. Powdered alloy metal in contact with disodium acetylide, chlorine trifluoride, sodium carbide or fused ammonium nitrate poses a risk of explosion. Solutions of sodium azide in contact with this metal can form lead azide, which is a detonating compound. Strong reactions can also occur between the molten alloy and active metals, such as sodium, potassium, and lithium.

Hazardous Decomposition Products: High temperature operations such as oxy-acetylene cutting or burning, electric arc welding or overheating of a molten bath will generate highly toxic fumes of lead, arsenic and antimony oxides. All are highly soluble in body fluids and the particle size of the metal fumes is largely within the respirable size range, which increases the likelihood of inhalation and deposition of the fume within the body. Under reducing conditions (i.e. any strong acid or base plus an active metal) or in the presence of freshly formed hydrogen, highly toxic ARSINE and STIBINE gas may be evolved.

SECTION 11. TOXICOLOGICAL INFORMATION

General: The primary route of exposure to this lead-antimony-arsenic alloy is by inhalation or ingestion of dust and fumes.

NOTE: *Highly toxic Arsine and Stibine gas may be generated when this alloy, its dust or dross are in contact with acid solutions under certain conditions. This situation should be regarded as being immediately life threatening.* Exposure to these gases can cause a rapid destruction of red blood cells, tea-colored or bloody urine, cessation of urine production, and kidney failure. The subjective signs of exposure are headache, nausea, back and upper abdominal pains, and jaundice. Severe kidney damage is common in victims who survive acute poisoning.

Acute:

Skin/Eye: Contact with dust or fume may be irritating to the eyes, skin and mucous membranes. Prolonged and repeated exposure may result in dermatitis of the skin. This material is not significantly absorbed through the skin.

Inhalation: Exposure to dust or fume may cause nausea, vomiting, abdominal pain, dryness and irritation of the nose and throat, coughing, metallic taste, headache, fatigue, sleep disturbances, weight loss, anemia, and pain in legs, arms, and joints. An intense, short-term exposure could cause pulmonary congestion and edema as well as acute encephalopathy with seizures, coma, and death. However, short-term exposures of this magnitude are unlikely in industry today. Kidney and liver damage, blood changes, and possible changes to the menstrual cycle as well as an increased risk of spontaneous abortion may occur from acute exposure.

Ingestion: Symptoms due to ingestion of dust or fume would be similar to those from inhalation. Other health effects such as constipation or bloody diarrhea might also occur.

Chronic:

Prolonged exposure to dust and fumes from this alloy may produce many of the symptoms of short-term exposure and may also cause central nervous system damage, gastrointestinal disturbances, hematological changes, skin rashes, dermatitis, thickening and/or increased pigmentation of the skin and, rarely, wrist drop. Reduced hemoglobin production has been associated with low lead exposures. Symptoms of central nervous system damage due to moderate exposure to lead or arsenic include fatigue, headaches, tremors and hypertension. Very high exposure to lead and/or arsenic can result in encephalopathy with symptoms of hallucinations, convulsions, and delirium. Kidney and liver dysfunction and possible injury have also been associated with chronic lead and antimony poisoning. Chronic over-exposure to lead has been implicated as a causative agent for the impairment of male and female reproductive capacity. Chronic antimony over-exposure has been implicated as a causative agent for alterations of the female menstrual cycle. Both arsenic and antimony have been reported as causing an increased incidence of spontaneous abortions. Pregnant women should be protected from excessive exposure, as lead can cross the placental barrier and unborn children may suffer neurological damage or developmental problems due to excessive lead exposure. Teratogenic and mutagenic effects from exposure to lead have been reported in some studies but not in others. Lead and lead compounds are listed as an *A3 Carcinogen (Confirmed Animal Carcinogen with Unknown Relevance to Humans)* by the ACGIH. IARC has listed lead compounds as *Group 2A Carcinogens (Probably Carcinogenic to Humans)* while lead metal is listed as *Group 2B (Possibly Carcinogenic to Humans)*. The NTP has recently listed lead and lead compounds as *Reasonably Anticipated to be a Human Carcinogen*. OSHA and the EU do not currently list lead as a human carcinogen. Arsenic and inorganic arsenic compounds are listed as an *A1 Carcinogen (Confirmed Human Carcinogen)* by the ACGIH and as a *Group 1 Carcinogen (Carcinogenic to Humans)* by IARC. The NTP and OSHA also identify arsenic and inorganic arsenic compounds as *Known Human Carcinogens*. The EU does consider some compounds of arsenic, including arsenic oxides, to be carcinogenic, but does not include arsenic in the metallic form. Antimony is not considered a human carcinogen by OSHA, the NTP, the ACGIH, IARC or the EU.

Animal Toxicity:

<u>Hazardous Ingredient:</u>	<u>Acute Oral Toxicity:</u>	<u>Acute Dermal Toxicity:</u>	<u>Acute Inhalation Toxicity:</u>
Lead	No data	No data	No data
Antimony	No data	No data	No data
Arsenic	763 mg/kg [†]	No data	No data

[†] LD₅₀, Rat,Oral,

SECTION 12. ECOLOGICAL INFORMATION

Since this product is a metal alloy, it generally has little potential for ecological harm. However, longer-term exposure in both the aquatic and terrestrial environments may lead to the release of some compound forms of lead, arsenic and antimony. Depending upon various chemical factors in water or soil which influence bioavailability, these may lead to adverse effects in organisms. The typical "weathering" compounds of all three alloy constituents generally have low solubility in water and very low mobility in soil. While lead can readily bioaccumulate in aquatic and terrestrial organisms, this occurs to a much lesser extent with antimony and arsenic.

SECTION 13. DISPOSAL CONSIDERATIONS

If material cannot be returned to process or salvage, dispose of in accordance with applicable regulations. Special care should be taken in the disposal of lead-antimony-arsenic alloy waste to minimize the risk of generating arsine and stibine gases.

SECTION 14. TRANSPORT INFORMATION

PROPER SHIPPING NAME Not a regulated product in ingot form
 TRANSPORT CANADA CLASSIFICATION Not applicable
 U.S. DOT HAZARD CLASSIFICATION Not applicable
 TRANSPORT CANADA PRODUCT IDENTIFICATION NUMBER Not applicable
 U.S. DOT PRODUCT IDENTIFICATION NUMBER Not applicable
 MARINE POLLUTANT No
 IMO CLASSIFICATION Not regulated

SECTION 15. REGULATORY INFORMATION

U.S.

INGREDIENTS LISTED ON TSCA INVENTORY Yes
 HAZARDOUS UNDER HAZARD COMMUNICATION STANDARD Antimony Yes
 Arsenic Yes
 Lead Yes

