

MATERIAL SAFETY DATA SHEET

1. SUBSTANCE AND SOURCE IDENTIFICATION

National Institute of Standards and Technology
Standard Reference Materials Program
100 Bureau Drive, Stop 2300
Gaithersburg, Maryland 20899-2300

SRM Number: C2415
MSDS Number: C2415
SRM Name: Battery Lead

Date of Issue: 22 November 2011

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Description: A unit of Standard Reference Material (SRM) C2415 consists of one disk 50 mm (2 in.) in diameter and 16mm (5/8 in.) thick. This SRM is intended for use as a composition standard for optical emission spectrometric methods of analysis.

Substance: Lead Alloy

Other Designations:

Antimony (Antimony black, antimony regulus, stibium, antimony element)
Arsenic (Arsenic black, metallic arsenic)
Lead (Plumbum)

2. HAZARDS IDENTIFICATION

NFPA Ratings (Scale 0–4): Health = 2 Fire = 0 Reactivity = 0

Major Health Hazards: Lead is a cumulative toxin and repeated exposures can cause high levels to build up. Over exposure to lead either through acute or chronic exposure, can result in severe damage to the nervous system, urinary system, and reproductive system. Lead has been shown to cause cancer and birth defects. Antimony and Arsenic cause respiratory tract, skin and eye irritation. Arsenic may cause nervous system damage, allergic reactions and is a cancer hazard.

Physical Hazards: There are no known physical hazards associated with this material.

Potential Health Effects

Inhalation: Short term inhalation of lead may cause irritation, nausea, vomiting, kidney damage, liver damage. Prolonged exposure to lead may result in an accumulation in body tissues and exert adverse effects on the blood, nervous system, heart, endocrine and immune systems, kidneys, and reproduction. Inhalation of antimony may cause irritation of the respiratory tract; chronic exposure may cause stomatitis, dry throat, metallic taste, laryngitis, nausea bronchitis. Inhalation of arsenic may cause severe irritation of the nasal mucosa, larynx and bronchi, pain in the chest and possibly pulmonary edema; chronic inhalation may cause a catarrhal state of the mucous membranes, mild tracheobronchitis and perforation of the nasal septum.

Skin Contact: Prolonged or repeated exposure to lead may cause irritation; exposure to lead powder may cause dermatitis. Direct contact with antimony dusts or its compounds may cause irritation with itching; chronic dermal exposure may cause papules and pustules. Arsenic irritates the skin with erythema; chronic exposure may cause eczematous erythema, swelling and papules.

Eye Contact: Contact with lead may cause eye irritation. Direct contact with antimony dusts may cause irritation and inflammation of the cornea; repeated exposure may cause conjunctivitis. Arsenic dust may cause irritation characterized by itching, burning and watering of the eyes; repeated exposure may cause conjunctivitis.

Ingestion: Ingestion of this material is unlikely under normal conditions of use. Ingestion of lead may cause kidney damage or liver damage; chronic ingestion may result in accumulation in body tissues and may also cause cancer. Ingestion of antimony may cause violent irritation of the nose, throat, stomach and intestines, vomiting, severe diarrhea and low blood pressure. Chronic ingestion of antimony may cause sores in the mouth, and degenerative liver and kidney damage. Ingestion of large doses of arsenic may cause systemic poisoning; chronic ingestion may cause damage to the nervous system.

Listed as a Carcinogen/Potential Carcinogen:**Component: Lead**

In the National Toxicology Program (NTP) Report on Carcinogens
 In the International Agency for Research on Cancer (IARC) Monographs
 By the Occupational Safety and Health Administration (OSHA)

Yes	No
X ^(a)	
X ^(b)	
	X

^(a)Lead is listed as reasonably anticipated to be a human carcinogen per NTP.^(b)IARC lists inorganic lead in Group 2A (probably carcinogenic to humans).**Component: Antimony**

In the NTP Report on Carcinogens
 In the IARC Monographs
 By OSHA

Yes	No
	X
	X
	X

Component: Arsenic

In the NTP Report on Carcinogens
 In the IARC Monographs
 By OSHA

Yes	No
X ^(a)	
X ^(b)	
X ^(c)	

^(a)Arsenic is listed as known human carcinogen per NTP.^(b)IARC lists Arsenic in Group 1 (carcinogenic to humans).^(c)OSHA lists Inorganic Arsenic (Designated Carcinogenic).**3. COMPOSITION AND INFORMATION ON HAZARDOUS INGREDIENTS**

Component ^(a)	CAS Number	EC Number (EINECS)	Nominal Mass Concentration (%)
Lead	7439-92-1	231-100-4	96.4
Antimony	7440-36-0	231-146-5	2.9
Arsenic	7440-38-2	231-148-6	0.2

^(a) Hazardous components 1% or greater; carcinogens 0.1% or greater are listed in compliance with OSHA 29 CFR 1910.1200(g)(2)(i)(C)(1).**Component: Lead**

EC Classification: Xn, N
EC Risk (R No.): 20/22, 33, 50/53, 61, 62
EC Safety (S No.): 45, 53, 60, 61

Component: Antimony

EC Classification: Xn, N
EC Risk (R No.): 20/22, 51/53
EC Safety (S No.): 61

Component: Arsenic

EC Classification: T, N
EC Risk (R No.): 23/25, 50/53
EC Safety (S No.): 20/21, 28, 45, 60, 61

EC Classification Risk/Safety Phrases: Refer to Section 15, "Regulatory Information".**4. FIRST AID MEASURES****Inhalation:** If adverse effects occur, remove to uncontaminated area. If not breathing, give artificial respiration or oxygen by qualified personnel. Seek immediate medical attention.**Skin Contact:** Rinse affected area with copious amounts of water followed by washing with soap and water for at least 15 minutes while removing contaminated clothing. Seek medical attention.**Eye Contact:** Immediately flush eyes, including under the eyelids with copious amounts of water for at least 15 minutes. Seek immediate medical attention.**Ingestion:** Contact a poison control center immediately for instructions. Seek immediate medical attention.

5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Negligible fire and explosion hazard.

Extinguishing Media: Dolomite, dry powder for metal fires, dry sand, and graphite.

Fire Fighting: Avoid inhalation of material or combustion by-products. Wear full protective clothing and NIOSH-approved self-contained breathing apparatus (SCBA).

Flash Point: Not applicable.

Autoignition Temp.: Not applicable.

Flammability Limits in Air

Upper (Volume %): Not applicable.

Lower (Volume %): Not applicable.

Products of Combustion: Thermal decomposition may release hazardous or toxic gases.

6. ACCIDENTAL RELEASE MEASURES

Occupational Release: Place in suitable container for proper disposal.

Disposal: Refer to Section 13, "Disposal Considerations".

7. HANDLING AND STORAGE

Storage: Store and handle in accordance with all current regulations and standards. Keep separated from incompatible substances.

Safe Handling Precautions: Use methods to minimize dust. See Section 8, "Exposure Controls and Personal Protection".

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Exposure Limits:

Component: Lead

NIOSH (TWA): 0.050 mg/m³

NIOSH (IDLH): 100 mg/m³

ACGIH (TWA): 0.05 mg/m³

OSHA (TWA): 50 µg/m³

OSHA (Action Level): 30 µg/m³

Component: Antimony

NIOSH (TWA): 0.5 mg/m³

NIOSH (IDLH): 50 mg/m³

ACGIH (TWA): 0.5 mg/m³

OSHA (TWA): 0.5 mg/m³

Component: Arsenic

NIOSH (Ceiling, 15 min): 0.002 mg/m³

NIOSH (IDLH): 5 mg/m³

ACGIH (TWA): 0.01 mg/m³

OSHA (TWA): 10 µg/m³

Ventilation: Use local exhaust ventilation system. Ensure compliance with applicable exposure limits. Refer to the ACGIH document, *Industrial Ventilation, a Manual of Recommended Practices*.

Respirator: If workplace conditions warrant a respirator, a respiratory protection program that meets OSHA 29 CFR 1910.134 must be followed. Refer to NIOSH 42 CFR 84 for applicable certified respirators.

Eye Protection: Wear chemical safety goggles. An eye wash station should be readily available near areas of use.

Personal Protection: Wear appropriate protective clothing and chemically resistant gloves to prevent skin exposure.

9. PHYSICAL AND CHEMICAL PROPERTIES

Component: Lead

Appearance: white to grey solid, odor not available

Molar Mass: 207.20 g/mol

Molecular Formula: Pb

Specific Gravity (water = 1): 11.3

Water Solubility: Almost insoluble

Boiling Point: 1740 °C (3164 °F)

Melting Point: 328 °C (622 °F)

Component: Antimony

Appearance: lustrous white solid, odor not available

Molar Mass: 121.75 g/mol

Molecular Formula: Sb

Specific Gravity (water = 1): 6.68

Water Solubility: Insoluble

Boiling Point: 1750 °C (3182 °F)

Melting Point: 630 °C (1166 °F)

Component: Arsenic

Appearance: grey to black solid, garlic odor

Molar Mass: 74.92 g/mol

Molecular Formula: As

Specific Gravity (water = 1): Not available

Water Solubility: Insoluble

Sublimation Point: 613 °C (1135 °F)

Melting Point: 814 °C (36 atm, 1497 °F)

10. STABILITY AND REACTIVITY

Stability: Stable Unstable

Stable at normal temperatures and pressure.

Conditions to Avoid: None reported.

Incompatible Materials: Oxidizing materials, halogens, combustible materials, peroxides, metals, metal carbide, and acids.

Fire/Explosion Information: See Section 5, "Fire Fighting Measures".

Hazardous Decomposition: Thermal decomposition will produce oxides of lead.

Hazardous Polymerization: Will Occur Will Not Occur

11. TOXICOLOGICAL INFORMATION

Route of Entry: Inhalation Skin Ingestion

Toxicity Data

Component: Lead

No data available.

Component: Antimony

Rat, Inhalation LD₅₀: 100 mg/m³

Component: Arsenic

Rat, Inhalation LD₅₀: 763 mg/m³

Health Effects (Acute and Chronic): See Section 2, "Hazards Identification" for potential health effects.

Target Organ(s):

Component: Lead

Nervous system and kidneys, teratogen.

Component: Antimony
Eyes, skin, respiratory system.

Component: Arsenic
Immune system (sensitizer), nervous system.

Medical Conditions Aggravated by Exposure: This material may aggravate pre-existing eye disorders, respiratory disorders, digestive disorders, skin disorders, and allergies.

Mutagen/Teratogen:

This material has been reviewed and the Registry of Toxic Effects of Chemical Substance (RTECS) publishes the following endpoints.

Component: Lead
Mutagenic effects Human: 50 µg/m³
Reproductive effects, Oral Mouse, TDLo: 24 µg/mg (Multigeneration)

Component: Antimony
Tumorigenic effects Rat, Inhalation TCLo: 50mg/m³ (7 hours)

Component: Arsenic
Tumorigenic effects, Man TDLo: 76 mg/kg (12 years)
Mutagenic effects, Human: 5µmol/L (1 hour)
Reproductive effects, Rat Oral TDLo: 605 µg/kg (prior to copulation 35 weeks)

12. ECOLOGICAL INFORMATION

Ecotoxicity Data

Component: Lead
Aquatic Toxicity – Fish
Carp (*Cyprinus carpio*), 0.44 mg/L (LC₅₀/96 hours, semi-static)
Trout (*Oncorhynchus mykiss*), 1.32 mg/L (static)
Trout (*Oncorhynchus mykiss*), 1.77 mg/L (LC₅₀/96 hours, flow-through)

Component: Antimony
No ecotoxicity data listed.

Component: Arsenic
No ecotoxicity data listed.

13. DISPOSAL CONSIDERATIONS

Waste Disposal: Dispose in accordance with all applicable federal, state, and local regulations. Hazardous waste number D008. Dispose of in accordance to US EPA 40 CFR 262 for concentrations at or above the regulatory level. Regulatory level, 5.0 mg/L.

14. TRANSPORTATION INFORMATION

U.S. DOT and IATA: This material is not regulated by DOT or IATA.

15. REGULATORY INFORMATION

U.S. REGULATIONS

CERCLA Sections 102a/103 (40 CFR 302.4): Not regulated.

SARA Title III Section 302 (40 CFR 355.30): Not regulated.

SARA Title III Section 304 (40 CFR 355.40): Not regulated.

SARA Title III Section 313 (40 CFR 372.65):

Lead, 0.1 % Supplier notification limit. Antimony 1 % de minimis concentration. Arsenic 0.1 % de minimis concentration.

OSHA Process Safety (29 CFR 1910.119): Not regulated.

SARA Title III Sections 311/312 Hazardous Categories (40 CFR 370.21):

ACUTE HEALTH:	Yes.
CHRONIC HEALTH:	Yes.
FIRE:	No.
REACTIVE:	No.
PRESSURE:	No.

STATE REGULATIONS

California Proposition 65:

WARNING! This product contain chemicals (lead, arsenic) known to the state of California to cause cancer.

WARNING! This product contains chemicals (lead, arsenic) known to the state of California to cause reproductive/developmental effects.

CANADIAN REGULATIONS

WHMIS Information: Not provided for this material.

EUROPEAN REGULATIONS

Component: Lead (lead compounds with the exception of those specified elsewhere in the EC Annex VI.)

EC Classification (assigned):

Xn	Harmful.
N	Dangerous to the environment.

EC Risk Phrases:

R20/22	Harmful by inhalation and if swallowed.
R33	Danger of cumulative effects.
R50/53	Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
R61	May cause harm to unborn child. Reproductive Toxin Category 1.
R62	Possible risk of impaired fertility. Reproductive Toxin Category 3.

EC Safety Phrases:

S45	In case of accident or if you feel unwell, seek medical advice immediately (show label where possible).
S53	Avoid exposure – obtain special instructions before use.
S60	This material and its container must be disposed of as hazardous waste.
S61	Avoid release to the environment. Refer to special instructions/Safety data sheet.

Component: Antimony (compounds with the exception of those specified elsewhere in the EC Annex VI.)

EC Classification (assigned):

Xn	Harmful.
N	Dangerous to the environment.

EC Risk Phrases:

R20/22	Harmful by inhalation and if swallowed.
R51/53	Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

EC Safety Phrases:

S61	Avoid release to the environment. Refer to special instructions/Safety data sheet.
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Component: Arsenic (compounds with the exception of those specified elsewhere in the EC Annex VI.)

EC Classification (assigned):

T	Harmful.
N	Dangerous to the environment.

EC Risk Phrases:

R23/25	Harmful by inhalation and if swallowed.
R50/53	Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

EC Safety Phrases:

S20/21	Toxic by inhalation and if swallowed.
S28	After contact with skin, wash immediately with plenty of water.
S45	In case of accident or if you feel unwell, seek medical advice immediately (show label where possible).
S60	This material and its container must be disposed of as hazardous waste.
S61	Avoid release to the environment. Refer to special instructions/Safety data sheet.

NATIONAL INVENTORY STATUS

U.S. Inventory (TSCA): Lead listed. Antimony listed. Arsenic listed.

TSCA 12(b)

Export Notification: Not listed.

16. OTHER INFORMATION

Sources: ChemAdvisor, Inc., MSDS *Lead* 16 September 2011.

ChemAdvisor, Inc., MSDS *Antimony* 16 September 2011.

ChemAdvisor, Inc., MSDS *Arsenic* 16 September 2011.

EC; European Chemical Substance Information System (ESIS), *Lead Compounds with the Exception of Those Specified Elsewhere in this Annex, Index No. 082-001-00-6*; available at <http://esis.jrc.ec.europa.eu/index.php?PGM=cla> (accessed Nov 2011).