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School Materials Safety Manual:

No. 247 Lead (Inorganic)
Issued 9/90

◆ SECTION 1 INTRODUCTION

Material Lead (Inorganic), ca 100%

Chemical Formula Pb

CAS Number 7439-92-1

DOT Classification Not listed as a Hazardous Material for Transportation (49 CFR 172.101)

EPA Classification Listed as a RCRA Hazardous Waste (40 CFR 261.33), a CERCLA Hazardous Substance (40 CFR 302.4), and a SARA Toxic Chemical (40 CFR 372.65). Not listed as a SARA Extremely Hazardous Substance (40 CFR 355).

OSHA Classification Listed as an Air Contaminant (29 CFR 1910.1000, Table Z-1-A)

Synonyms Lead oxide; lead salts, inorganic; metallic lead; plumbum

NFPA Hazard Rating

Not found

Genium Hazard Rating

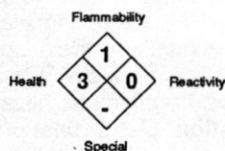
4 = Extreme

3 = High

2 = Moderate

1 = Slight

0 = Minimum



Description Exists widely in many ores. Its main commercial source is galena (lead sulphide). Lead mineral is separated from crude ores by blast-furnace smelting, drossing, or electrolytic refining. Bluish-white, silvery, gray, very soft metal.

Overview Used mostly in manufacturing storage batteries. Other uses are in manufacturing tetraethyl lead and both organic and inorganic lead compounds in ceramics, plastics, and electronic devices; in producing ammunition, solder, cable covering, sheet lead, and other metal products (brass, pipes, caulking); in metallurgy; in weights and as ballast; as a chemical intermediate for lead alkyls and pigments; as a construction material for tank linings, piping, and equipment used to handle corrosive gases and liquids used in sulfuric acid manufacturing, petroleum refining, halogenation, sulfonation, extraction, and condensation; and for x-ray and atomic radiation protection. Inorganic lead is a potent systemic poison. Organic lead (e.g., tetraethyl lead) has severe, but different, health effects. Occupational lead poisoning is frequently due to dust and fume inhalation. Another source of lead exposure may be antiquated or poorly designed drinking water delivery systems. Major affected systems are nervous, blood, and reproductive systems, and kidneys. Severe acute short- or long-term exposure may cause health impairment or disease. *Children are more susceptible to severe lead toxicity since they absorb a much larger lead fraction than adults do.* Lead is a cumulative poison and by the time clinical symptoms appear, its damage is already done. Most likely found in schools as an ingredient of paints, ceramics, stained glass, wire, foil, piping, and batteries. The art room is probable environment for lead exposure. Eliminate exposure using alternative products. For example, use lead-free solder for stained glass and other crafts. Another exposure source may be lead components in H₂O coolers. An internal EPA report concluded that harmful amounts of lead exist in school drinking water. The EPA

considers lead concentrations >20 ppb hazardous to children. In 1988 Congress passed a law requiring the EPA to issue test guidelines and to help schools with the testing.

Manufacturer Always request an up-to-date MSDS from your chemical supplier. That sheet should include the substance's manufacturer and emergency phone number. This *Manual's* Resources/Manufacturers Index lists some larger manufacturers and available emergency phone numbers.

◆ SECTION 2 USE AND STORAGE DATA

Preliminary Planning Considerations *Plan for safe disposal of school-generated chemical waste.* Check applicable regulations prior to use. Restrict use to fume hood to avoid exceeding TLVs (Sec. 4). For safety, *do not wear contact lenses in the lab:* soft lenses may absorb, and all lenses concentrate, irritants. Particles adhering to contact lens surfaces can cause corneal damage. Wear impervious gloves to minimize skin contact. Employees and students should know the location of eyewash and shower facilities near where chemicals are used. Be sure eyewash stations and safety showers are in good working order.

Usage Precautions and Procedure Before using, *read container label* and follow all precautions. Avoid inhalation of dust or fumes and ingestion of lead-containing particulates. Do not smoke in usage or storage areas. Practice good housekeeping. Wear safety glasses or goggles and appropriate protective clothing to work with lead. After working with chemical materials, and before eating, drinking, or smoking, always wash hands and face. Remove and launder contaminated clothing before reusing.

Additional Data Stable at room temperature under normal handling and storage conditions, lead tarnishes on exposure to air. It does not polymerize. Incompatibilities include zirconium and oxidants. Lead is attacked by pure water and weak organic acids in presence of oxygen. It is resistant to tap water, hydrofluoric acid, brine, and solvents. Lead-containing rubber gloves may ignite in nitric acid.

Preferred Storage Location and Methods Store in tightly closed containers in a cool, dry, well-ventilated area away from all incompatible materials, direct sunlight, and heat and ignition sources. To separate incompatible chemicals, store by chemical family, not by alphabetical name. Protect all chemical containers from physical damage. Prohibit smoking in chemical storage areas. Purchase amounts equal to only a year's needs, if at all.

◆ SECTION 3 SPILL/DISPOSAL PROCEDURES

If Spilled Evacuate unnecessary personnel and ventilate spill area. Clean up spilled material promptly and thoroughly. Cleanup personnel should protect against dust or fume inhalation and skin or eye contact. Avoid creating dusty conditions. Water sprays may be used to prevent dust formation. Cleanup methods such as vacuuming with an appropriate high-efficiency particulate air filter (HEPA) or wet mopping minimize dust dispersion. Scoop the spilled material into closed containers for disposal or reclamation.

Disposal of Small Quantities *Handle emptied containers carefully since residues may remain.* Check regulations before disposal is necessary. Investigate recycling or reclamation rather than disposal of waste to a landfill. If this method is not in accord with existing regulations, con-

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tact your supplier or a licensed disposal contractor for specific treatment/disposal procedures.

Disposal of Larger Amounts Contact your supplier or a licensed disposal company.

Follow all applicable local, state, and Federal regulations for all waste disposal.

◆ **SECTION 4 HEALTH HAZARDS**

A potent, systemic poison, lead affects organ systems, including nervous, reproductive, blood formation, and gastrointestinal (GI) systems, and kidneys. The most important way lead enters the body is through inhalation, but it is ingestible when lead dust or unwashed hands contaminate food, drink, or cigarettes. Most ingested lead passes from the body in feces without absorption. Since adults may absorb only 5 to 15% of ingested lead, and children a much larger fraction, children are more susceptible to severe lead toxicity. Take extra precautions to eliminate a child's exposure to lead. The long-term effects of a child's exposure to lead exposure may include reduced mental ability or decreased cognitive function. Once in the body, lead circulates through the bloodstream to various organs. It concentrates and remains in bone for years. The amount of lead the body stores increases as exposure continues, with possibly cumulative effects. Depending on the dose entering the body, lead can be deadly within several days or affect health after many years. Very high doses can cause brain damage (encephalopathy).

1989-90 ACGIH TLV 8-hr TWA: 150 $\mu\text{g}/\text{m}^3$ (lead, inorganic, fumes and dusts)

1988 NIOSH REL 10-hr TWA: <100 $\mu\text{g}/\text{m}^3$

1989 OSHA PEL 8-hr TWA: 50 $\mu\text{g}/\text{m}^3$ (lead, inorganic compounds)

1985-6 Toxicity Data Human, oral, TD_{Lo} : 450 mg/kg ingested over 6 years affects peripheral and central nervous systems; Human, inhalation, TC_{Lo} : 10 $\mu\text{g}/\text{m}^3$ affects the GI tract and liver; Rat, oral, TD_{Lo} : 790 mg/kg affects multigeneration reproduction

Carcinogenicity Although the NTP and OSHA do not list lead as a carcinogen, the IARC lists it as probably carcinogenic to humans, but having (usually) no human evidence. However, both benign and malignant lead-induced neoplasms of the kidney and other organs in laboratory rodents are reported. Human male and female reproductive effects are also documented.

Acute Effects An acute, short-term dose of lead could cause acute encephalopathy with seizures, coma, and death. However, short-term exposures of this magnitude are rare. Reversible kidney damage, as well as anemia, can result from acute exposure.

Chronic Effects Symptoms of chronic long-term over-exposure include appetite loss, nausea, metallic taste in the mouth, lead line on gum tissue, constipation, anxiety, anemia, pallor of face and eye grounds, excessive tiredness, weakness, insomnia, headache, nervous irritability, fine tremors, numbness, muscle and joint pain, and colic accompanied by severe abdominal pain. Paralysis of wrist and, less often, ankle extensor muscles may occur after years of increased lead absorption. Progressive central nervous system deterioration resulting in seizures,

delerium, coma, and death may occur. Kidney disease may also result from chronic overexposure, but few, if any, symptoms appear until severe kidney damage has occurred. Reproductive damage is characterized by decreased sex drive, impotence, and sterility in men; and by decreased fertility, abnormal menstrual cycles, and miscarriages in women. Unborn children may suffer neurologic damage or developmental problems due to excessive lead exposure in pregnant women. Lead poisoning's severest result is encephalopathy manifested by severe headache, convulsions, coma, delirium, and possibly death.

◆ **SECTION 5 FIRST AID PROCEDURES**

Eye Contact Promptly flush eyes with plenty of running water for at least 15 min, including under the eyelids. Get prompt medical attention.

Skin Contact Quickly remove contaminated clothing. After flushing with large amounts of water, wash exposed areas with soap and water. Consult a physician if any health complaints develop.

Inhalation Remove victim from exposure to fresh air and support breathing as necessary. Consult a physician.

Ingestion Get *prompt* medical attention. Never give anything by mouth to an unconscious or convulsing person. If large amounts of lead were ingested, induce vomiting with ipecac syrup. Consult a physician immediately.

Get proper in-school, paramedic, or community medical attention and support.

◆ **SECTION 6 FIRE PROCEDURES AND DATA**

Fire Hazards Flammable and moderately explosive in the form of dust when exposed to heat or flame. For major fires, firefighters should wear appropriate protective clothing and respirators. A self-contained breathing apparatus (SCBA) and full protective equipment are recommended. Isolate hazard area and deny entry. Do not release runoff from fire control methods to sewers or waterways.

Flash Point, Autoignition Temperature, and Flammability Limits in Air (vol. %) None reported

Hazardous Decomposition Products Thermal oxidative decomposition can produce highly toxic lead fumes.

Extinguishing Media Use dry chemical, carbon dioxide, water spray, or foam to extinguish fire.

◆ **SECTION 7 PHYSICAL DATA**

Boiling Point (at 1 atm) 3164 °F (1740 °C)

Melting Point (at 1 atm) 621.3 °F (327.4 °C)

Vapor Pressure 1.77 mm Hg at 1832 °F (1000 °C)

Solubility in Water (at 25 °C) Relatively insoluble in hot or cold water. Lead dissolves more easily at a low pH.

Molecular Weight 207.20

Specific Gravity (20 °C/4 °C) 11.34

References 26, 38, 73, 84, 85, 88, 89, 90, 100, 101, 103, 109, 124, 126, 132-134, 136, 138, 139, 142, 143; *GPC's MSDS Collection*, No. 713 (8/90)

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