



# Right to Know Hazardous Substance Fact Sheet

Common Name: **LEAD DIOXIDE**

Synonyms: Lead Brown; Lead Peroxide

Chemical Name: Lead Oxide (PbO<sub>2</sub>)

Date: September 2007

Revision: May 2017

CAS Number: 1309-60-0

RTK Substance Number: 1104

DOT Number: UN 1872

## Description and Use

**Lead Dioxide** is an odorless, brown crystal or powder. It is used in electrodes in *Lead-acid* storage batteries, and in the paint, rubber and ceramic industries.

## Reasons for Citation

- ▶ **Lead Dioxide** is on the Right to Know Hazardous Substance List because it is cited by OSHA, ACGIH, DOT, NIOSH, NTP, DEP, IARC and EPA.
- ▶ This chemical is on the Special Health Hazard Substance List.

SEE GLOSSARY ON PAGE 5.

## FIRST AID

### Eye Contact

- ▶ Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids. Remove contact lenses, if worn, while rinsing.

### Skin Contact

- ▶ Remove contaminated clothing. Wash contaminated skin with soap and water.

### Inhalation

- ▶ Remove the person from exposure.
- ▶ Begin rescue breathing (using universal precautions) if breathing has stopped and CPR if heart action has stopped.
- ▶ Transfer promptly to a medical facility.

## EMERGENCY NUMBERS

Poison Control: 1-800-222-1222

CHEMTREC: 1-800-424-9300

NJDEP Hotline: 1-877-927-6337

National Response Center: 1-800-424-8802

**EMERGENCY RESPONDERS >>>> SEE BACK PAGE**

## Hazard Summary

Hazard Rating	NJDOH	NFPA
<b>HEALTH</b>	3	-
<b>FLAMMABILITY</b>	0	-
<b>REACTIVITY</b>	1	-

CARCINOGEN  
POISONOUS FUMES ARE PRODUCED IN FIRE  
CONTAINERS MAY EXPLODE IN FIRE  
STRONG OXIDIZER  
DOES NOT BURN

*Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe*

- ▶ **Lead Dioxide** can affect you when inhaled or swallowed.
- ▶ **Lead Dioxide** is a CARCINOGEN. HANDLE WITH EXTREME CAUTION.
- ▶ Contact can irritate the skin and eyes.
- ▶ Inhaling **Lead Dioxide** can irritate the nose and throat.
- ▶ Exposure can cause headache, irritability, and muscle and joint pain.
- ▶ Repeated exposure can cause *Lead poisoning* with metallic taste, colic and muscle cramps.
- ▶ **Lead Dioxide** may damage the nervous system.
- ▶ Exposure may cause kidney and brain damage, and anemia.
- ▶ **Lead Dioxide** is noncombustible but is a STRONG OXIDIZER. Reactions with ORGANICS, COMBUSTIBLES or REDUCING AGENTS may release enough heat to cause a fire.

## Workplace Exposure Limits

The following exposure limits are for *inorganic Lead compounds* (measured as *Lead*):

OSHA: The legal airborne permissible exposure limit (PEL) is **0.05 mg/m<sup>3</sup>** averaged over an 8-hour workshift.

NIOSH: The recommended airborne exposure limit (REL) is **0.05 mg/m<sup>3</sup>** averaged over a 10-hour workshift. Air concentrations should be maintained so that blood *Lead* is less than **0.06 mg per 100 grams** of whole blood.

ACGIH: The threshold limit value (TLV) is **0.05 mg/m<sup>3</sup>** averaged over an 8-hour workshift.

- ▶ **Lead Dioxide** is a PROBABLE CARCINOGEN in humans. There may be no safe level of exposure to a carcinogen, so all contact should be reduced to the lowest possible level.

### Determining Your Exposure

- ▶ Read the product manufacturer's Material Safety Data Sheet (MSDS) and the label to determine product ingredients and important safety and health information about the product mixture.
- ▶ For each individual hazardous ingredient, read the New Jersey Department of Health and Senior Services Hazardous Substance Fact Sheet, available on the RTK Program website (<http://nj.gov/health/workplacehealthandsafety/right-to-know/>) or in your facility's RTK Central File or Hazard Communication Standard file.
- ▶ You have a right to this information under the New Jersey Worker and Community Right to Know Act, the Public Employees Occupational Safety and Health (PEOSH) Act if you are a public worker in New Jersey, and under the federal Occupational Safety and Health Act (OSHA) if you are a private worker.
- ▶ The New Jersey Right to Know Act and the PEOSH Hazard Communication Standard (N.J.A.C. 12:100-7) requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard (29 CFR 1910.1200) requires private employers to provide similar information and training to their employees.

This Fact Sheet is a summary of available information regarding the health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

### Health Hazard Information

#### Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Lead Dioxide**:

- ▶ Contact can irritate the skin and eyes.
- ▶ Inhaling **Lead Dioxide** can irritate the nose and throat.
- ▶ Exposure can cause headache, irritability, reduced memory, disturbed sleep, and mood and personality changes.
- ▶ Contact can cause upset stomach, poor appetite, weakness and fatigue.

#### Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Lead Dioxide** and can last for months or years:

#### Cancer Hazard

- ▶ **Lead Dioxide** is a PROBABLE CARCINOGEN in humans. There is some evidence that *inorganic Lead compounds* cause lung, brain, stomach, and kidney cancer in humans and they have been shown to cause kidney cancer in animals.
- ▶ Many scientists believe there is no safe level of exposure to a carcinogen.

#### Reproductive Hazard

- ▶ While **Lead Dioxide** has not been identified as a teratogen or a reproductive hazard, *Lead* and certain *Lead compounds* are teratogens and may also cause reproductive damage, such as reduced fertility and interference with menstrual cycles. **Lead Dioxide** should be handled WITH EXTREME CAUTION.

#### Other Effects

- ▶ Repeated exposure to **Lead Dioxide** can cause *Lead poisoning*. Symptoms include metallic taste, poor appetite, weight loss, colic, nausea, vomiting, and muscle cramps.
- ▶ Higher levels can cause muscle and joint pain, and weakness.
- ▶ High or repeated exposure may damage the nerves causing weakness, "pins and needles," and poor coordination in the arms and legs.
- ▶ *Lead* exposure increases the risk of high blood pressure.
- ▶ **Lead Dioxide** may cause kidney and brain damage, and damage to the blood cells causing anemia.
- ▶ Repeated exposure causes *Lead* to accumulate in the body. It can take years for the body to get rid of excess *Lead*.

### Medical

#### Medical Testing

Before first exposure, and every six (6) months thereafter, OSHA requires your employer to provide (for persons exposed to **30 micrograms** or more of *Lead per cubic meter* of air for 30 days or more per year):

- ▶ Blood *Lead* test
- ▶ ZPP (a special test for the effects of *Lead* on blood cells)

For employees with blood *Lead* levels above **40 micrograms per 100 grams** of whole blood (**40 micrograms per deciliter**), OSHA requires blood *Lead* level monitoring every two months until two consecutive blood *Lead* levels are below **40 micrograms per 100 grams** of whole blood. These employees must undergo a medical evaluation, which should include:

- ▶ Complete work and medical history
- ▶ Thorough physical examination, including examination of the central nervous system
- ▶ Blood *Lead* test
- ▶ ZPP
- ▶ Hemoglobin, hematocrit with complete blood count
- ▶ Urinalysis with microscopic examination
- ▶ Any other tests determined necessary by the examining physician

This evaluation should be performed at least annually.

OSHA requires your employer to provide you and your doctor with a copy of the OSHA *Lead* Standards (29 CFR 1910.1025 and 1926.62).

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under the OSHA Access to Employee Exposure and Medical Records Standard (29 CFR 1910.1020).

### Mixed Exposures

- ▶ Body exposures to *Lead* from hobbies using *Lead* solder or pigments, target practice, and drinking moonshine made in *Leaded* containers will increase *Lead* levels. Repeated breathing or handling of *Leaded* gasoline may also add to body *Lead* levels.

### Workplace Controls and Practices

Very toxic chemicals, or those that are reproductive hazards or sensitizers, require expert advice on control measures if a less toxic chemical cannot be substituted. Control measures include: (1) enclosing chemical processes for severely irritating and corrosive chemicals, (2) using local exhaust ventilation for chemicals that may be harmful with a single exposure, and (3) using general ventilation to control exposures to skin and eye irritants. For further information on workplace controls, consult the NIOSH document on Control Banding at [www.cdc.gov/niosh/topics/ctrlbanding/](http://www.cdc.gov/niosh/topics/ctrlbanding/).

The following work practices are also recommended:

- ▶ Label process containers.
- ▶ Provide employees with hazard information and training.
- ▶ Monitor airborne chemical concentrations.
- ▶ Use engineering controls if concentrations exceed recommended exposure levels.
- ▶ Provide eye wash fountains and emergency showers.
- ▶ Wash or shower if skin comes in contact with a hazardous material.
- ▶ Always wash at the end of the workshift.
- ▶ Change into clean clothing if clothing becomes contaminated.
- ▶ Do not take contaminated clothing home.
- ▶ Get special training to wash contaminated clothing.
- ▶ Do not eat, smoke, or drink in areas where chemicals are being handled, processed or stored.
- ▶ Wash hands carefully before eating, smoking, drinking, applying cosmetics or using the toilet.

In addition, the following may be useful or required:

- ▶ Specific engineering controls are required for this chemical by OSHA. Refer to the OSHA *Lead* Standards (29 CFR 1910.1025 and 1926.62).
- ▶ Use a vacuum or a wet method to reduce dust during clean-up. DO NOT DRY SWEEP.
- ▶ When vacuuming, a high efficiency particulate air (HEPA) filter should be used, not a standard shop vacuum.

### Personal Protective Equipment

The OSHA Personal Protective Equipment Standard (29 CFR 1910.132) requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

#### Gloves and Clothing

- ▶ Avoid skin contact with **Lead Dioxide**. Wear personal protective equipment made from material which can not be permeated and/or degraded by this substance. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
- ▶ Safety equipment manufacturers recommend *Nitrile*, *Latex*, or *Rubber* for gloves and DuPont *Tyvek*® and *Tychem*® *Polycoat*, *QC*, *CPF-1*, *SL* and *CPF-2* as protective materials for clothing.
- ▶ All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

#### Eye Protection

- ▶ For impact hazards (such as flying fragments, chips or particles), wear safety glasses with side shields or safety goggles.
- ▶ Wear a face shield along with goggles when working with corrosive, highly irritating or toxic substances.

#### Respiratory Protection

**Improper use of respirators is dangerous.** Respirators should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing, and medical exams, as described in the OSHA Respiratory Protection Standard (29 CFR 1910.134).

- ▶ Where the potential exists for exposure not higher than **0.5 mg/m<sup>3</sup>** (as *Lead*), use a half-mask air purifying respirator equipped with high efficiency filters.
- ▶ Where the potential exists for exposure not higher than **2.5 mg/m<sup>3</sup>** (as *Lead*), use a full facepiece, air purifying respirator with high efficiency filters.
- ▶ Where the potential exists for exposure not higher than **50 mg/m<sup>3</sup>** (as *Lead*), use any powered-air purifying respirator with high efficiency filters or a half-mask supplied-air respirator operated in a positive pressure mode.
- ▶ Leave the area immediately if (1) while wearing a filter or cartridge respirator you can smell, taste, or otherwise detect **Lead Dioxide**, (2) while wearing particulate filters abnormal resistance to breathing is experienced, or (3) eye irritation occurs while wearing a full facepiece respirator. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter or cartridge. If the seal is no longer good, you may need a new respirator.
- ▶ Be sure to consider all potential exposures in your workplace. You may need a combination of filters, prefilters, cartridges, or canisters to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.

- ▶ Where the potential exists for exposure not higher than **100 mg/m<sup>3</sup>** (as *Lead*), use supplied-air respirators with full facepiece, hood, helmet or suit, operated in a positive pressure mode.
- ▶ Exposure to **100 mg/m<sup>3</sup>** (as *Lead*) is immediately dangerous to life and health. If the possibility of exposure above **100 mg/m<sup>3</sup>** (as *Lead*) exists, use a NIOSH approved self-contained breathing apparatus with a full facepiece operated in a pressure-demand or other positive-pressure mode equipped with an emergency escape air cylinder.

### Fire Hazards

If employees are expected to fight fires, they must be trained and equipped as stated in the OSHA Fire Brigades Standard (29 CFR 1910.156).

- ▶ Extinguish fire by flooding with water. DO NOT USE CO<sub>2</sub>, dry chemicals or halogenated extinguishing agents. **Lead Dioxide** itself does not burn.
- ▶ POISONOUS FUMES ARE PRODUCED IN FIRE, including *Lead Oxides*.
- ▶ CONTAINERS MAY EXPLODE IN FIRE.
- ▶ Use water spray to keep fire-exposed containers cool.
- ▶ **Lead Dioxide** may ignite combustibles and organics (wood, paper and oil).

### Spills and Emergencies

If employees are required to clean-up spills, they must be properly trained and equipped. The OSHA Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120) may apply.

If **Lead Dioxide** is spilled, take the following steps:

- ▶ Evacuate personnel and secure and control entrance to the area.
- ▶ Eliminate all ignition sources.
- ▶ Collect powdered material by moistening spilled material, or use a HEPA-filter vacuum, and deposit into sealed containers.
- ▶ Ventilate and wash area after clean-up is complete.
- ▶ DO NOT wash into sewer.
- ▶ It may be necessary to contain and dispose of **Lead Dioxide** as a HAZARDOUS WASTE. Contact your state Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.

### Handling and Storage

Prior to working with **Lead Dioxide** you should be trained on its proper handling and storage.

- ▶ A regulated, marked area should be established where **Lead Dioxide** is handled, used or stored.
- ▶ **Lead Dioxide** is a STRONG OXIDIZER which may react with ORGANICS, COMBUSTIBLES or REDUCING AGENTS to produce enough heat to cause a fire.

- ▶ **Lead Dioxide** is not compatible with FINELY POWDERED METALS; METAL CARBIDES; SULFUR COMPOUNDS; POTASSIUM; SODIUM; PHOSPHORUS; MAGNESIUM; CHLORINE TRIFLUORIDE; ZINC; NITROGEN; CESIUM ACETYLIDE; HYDROXYLAMINE; HYDROGEN PEROXIDE; HALOGENS; STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and AMINES.
- ▶ Store in tightly closed containers in a cool, well-ventilated area away from HEAT and DIRECT SUNLIGHT.
- ▶ Protect from SHOCK, FRICTION or PHYSICAL DAMAGE.

### Occupational Health Information Resources

The New Jersey Department of Health offers multiple services in occupational health. These services include providing informational resources, educational materials, public presentations, and industrial hygiene and medical investigations and evaluations.

#### For more information, please contact:

New Jersey Department of Health  
 Right to Know Program  
 PO Box 368  
 Trenton, NJ 08625-0368  
 Phone: 609-984-2202  
 Fax: 609-984-7407  
 E-mail: [rtk@doh.nj.gov](mailto:rtk@doh.nj.gov)  
 Web address:  
<http://nj.gov/health/workplacehealthandsafety/right-to-know/>

*The Right to Know Hazardous Substance Fact Sheets are not intended to be copied and sold for commercial purposes.*

## GLOSSARY

**ACGIH** is the American Conference of Governmental Industrial Hygienists. They publish guidelines called Threshold Limit Values (TLVs) for exposure to workplace chemicals.

**Boiling point** is the temperature at which a substance can change its physical state from a liquid to a gas.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is unique, identifying number, assigned by the Chemical Abstracts Service, to a specific chemical.

**CFR** is the Code of Federal Regulations, which are the regulations of the United States government.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes destruction of human skin or severe corrosion of containers.

**DEP** is the New Jersey Department of Environmental Protection.

**DOT** is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

**EPA** is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

**ERG** is the Emergency Response Guidebook. It is a guide for emergency responders for transportation emergencies involving hazardous substances.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

**IARC** is the International Agency for Research on Cancer, a scientific group.

**Ionization Potential** is the amount of energy needed to remove an electron from an atom or molecule. It is measured in electron volts.

**IRIS** is the Integrated Risk Information System database maintained by federal EPA. The database contains information on human health effects that may result from exposure to various chemicals in the environment.

**LEL or Lower Explosive Limit**, is the lowest concentration of a combustible substance (gas or vapor) in the air capable of continuing an explosion.

**mg/m<sup>3</sup>** means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

**NFPA** is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

**NIOSH** is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

**NTP** is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

**OSHA** is the federal Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

**PEOSHA** is the New Jersey Public Employees Occupational Safety and Health Act, which adopts and enforces health and safety standards in public workplaces.

**Permeated** is the movement of chemicals through protective materials.

**PIH** is a DOT designation for chemicals which are Poison Inhalation Hazards.

**ppm** means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

**STEL** is a Short Term Exposure Limit which is usually a 15-minute exposure that should not be exceeded at any time during a work day.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

**UEL or Upper Explosive Limit** is the highest concentration in air above which there is too much fuel (gas or vapor) to begin a reaction or explosion.

**Vapor Density** is the ratio of the weight of a given volume of one gas to the weight of another (usually *Hydrogen*), at the same temperature and pressure.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

Common Name: **LEAD DIOXIDE**

Synonyms: Lead Brown; Lead Peroxide

CAS No: 1309-60-0

Molecular Formula: PbO<sub>2</sub>

RTK Substance No: 1104

Description: Odorless, brown crystals or powder

**HAZARD DATA**

Hazard Rating	Firefighting	Reactivity
<b>3 - Health</b> <b>0 - Fire</b> <b>1 - Reactivity</b> <b>DOT#:</b> UN 1872 <b>ERG Guide #:</b> 141 <b>Hazard Class:</b> 5.1 (Oxidizer)	<b>Lead Dioxide</b> itself does not burn. Flood fire with water. DO NOT USE CO <sub>2</sub> , dry chemicals or halogenated extinguishing agents. POISONOUS FUMES ARE PRODUCED IN FIRE, including <i>Lead Oxides</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.	<b>Lead Dioxide</b> is a STRONG OXIDIZER which may react with ORGANICS, COMBUSTIBLES or REDUCING AGENTS to produce enough heat to cause a fire. <b>Lead Dioxide</b> is not compatible with FINELY POWDERED METALS; METAL CARBIDES; SULFUR COMPOUNDS; POTASSIUM; SODIUM; PHOSPHORUS; MAGNESIUM; CHLORINE TRIFLUORIDE; ZINC; NITROGEN; CESIUM ACETYLIDE; HYDROXYLAMINE; HYDROGEN PEROXIDE; HALOGENS; STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and AMINES.

**SPILL/LEAKS**

**Isolation Distance:** 10 to 25 meters (30 to 80 feet)  
 Moisten spilled material first or use a HEPA-filter vacuum for clean-up.  
 Toxic to aquatic organisms.  
 Hazardous to the environment and persists in the environment.  
 DO NOT wash into sewer.

**PHYSICAL PROPERTIES**

**Odor Threshold:** Odorless  
**Flash Point:** Noncombustible  
**Relative Density:** 9.38 g/cm<sup>3</sup>  
**Water Solubility:** Insoluble  
**Vapor Density:** 8.2 (air = 1)  
**Melting Point:** Decomposes at 554°F (290°C)

**EXPOSURE LIMITS**

**OSHA:** 0.05 mg/m<sup>3</sup>, 8-hr TWA (as *Lead*)  
**NIOSH:** 0.05 mg/m<sup>3</sup>, 10-hr TWA (as *Lead*)  
**ACGIH:** 0.05 mg/m<sup>3</sup>, 8-hr TWA (as *Lead*)  
**IDLH LEVEL:** 100 mg/m<sup>3</sup> (as *Lead*)  
**PAC LEVELS:** PAC-1 = 0.17 mg/m<sup>3</sup>; PAC-2 = 140 mg/m<sup>3</sup>; PAC-3 = 810 mg/m<sup>3</sup>

**PROTECTIVE EQUIPMENT**

**Gloves:** Nitrile, Latex, Rubber  
**Coveralls:** DuPont Tyvek® and Tychem® Polycoat, QC, CPF-1, SL and CPF-2  
**Boots:** Butyl, Neoprene  
**Respirator:** ≤0.5 mg/m<sup>3</sup> - N100  
 ≤2.5 mg/m<sup>3</sup> - full facepiece APR with High Efficiency filters  
 ≤50 mg/m<sup>3</sup> - full facepiece powered APR with High Efficiency filters  
 ≤100 mg/m<sup>3</sup> - Pressure-demand supplied-air  
 >100 mg/m<sup>3</sup> - Pressure-demand SCBA

**HEALTH EFFECTS**

**Eyes:** Irritation  
**Skin:** Irritation  
**Acute:** Headache, irritability, upset stomach, and weakness  
**Chronic:** *Inorganic Lead compounds* may cause lung, brain, stomach, and kidney cancer in humans.  
 Metallic taste, colic and muscle cramps.  
 Damage to the nervous system.

**FIRST AID AND DECONTAMINATION**

**Remove** the person from exposure.  
**Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.  
**Remove** contaminated clothing and wash contaminated skin with soap and water.  
**Transfer** to a medical facility.