



Hazardous Substance Fact Sheet

Right to Know

Common Name: **ARSENIC PENTAFLUORIDE**

Synonyms: Arsenic Fluoride

Chemical Name: Arsorane, Pentafluoro-

Date: February 2010

CAS Number: 7784-36-3

RTK Substance Number: 4171

DOT Number: UN 1955

Description and Use

Arsenic Pentafluoride is a colorless gas that forms white fumes in air. It is used in making electroconductive polymers.

Reasons for Citation

- ▶ **Arsenic Pentafluoride** is on the Right to Know Hazardous Substance List because it is cited by OSHA, ACGIH, DOT, NIOSH, NTP, DEP, IARC, IRIS, NFPA 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 30 minutes, lifting upper and lower lids. Remove contact lenses, if worn, while flushing. Seek medical attention.

Skin Contact

- ▶ Immediately flush with large amounts of water. Continue flushing while removing clothing. Apply 2.5% *Calcium Gluconate* gel to the affected skin. Massage the gel into the skin while wearing rubber gloves. Continue to reapply and massage until pain is entirely relieved. Seek medical assistance immediately.

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 LAST PAGE

Hazard Summary

Hazard Rating	NJDOH	NFPA
HEALTH	-	4
FLAMMABILITY	-	0
REACTIVITY	-	1
CARCINOGEN POISONOUS GASES ARE PRODUCED IN FIRE CONTAINERS MAY EXPLODE IN FIRE		

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

- ▶ **Arsenic Pentafluoride** can affect you when inhaled.
- ▶ **Arsenic Pentafluoride** is a CARCINOGEN. HANDLE WITH EXTREME CAUTION.
- ▶ Skin contact can cause irritation, burns, rash and loss of pigment.
- ▶ Eye contact can cause irritation and burns.
- ▶ Inhaling **Arsenic Pentafluoride** can irritate the nose and throat and can cause an ulcer or hole in the "bone" (septum) dividing the inner nose.
- ▶ Exposure to **Arsenic Pentafluoride** can cause weakness, poor appetite, headache and even death.
- ▶ **Arsenic Pentafluoride** may damage the nervous system and the liver.
- ▶ If **Arsenic Pentafluoride** is exposed to WATER, MOIST AIR or is involved in a fire it can release *Hydrogen Fluoride*. Consult the *Right to Know Hazardous Substance Fact Sheet on HYDROGEN FLUORIDE*.
- ▶ **Arsenic Pentafluoride** is not combustible, but it is a STRONG OXIDIZER that enhances the combustion of other substances.

Workplace Exposure Limits

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

- OSHA: The legal airborne permissible exposure limit (PEL) is **0.01 mg/m³** averaged over an 8-hour workshift.
- NIOSH: The recommended airborne exposure limit (REL) is **0.002 mg/m³**, which should not be exceeded in any 15-minute work period.
- ACGIH: The threshold limit value (TLV) is **0.01 mg/m³** averaged over an 8-hour workshift.

The following exposure limits are for *Hydrogen Fluoride*:

- OSHA: The legal airborne permissible exposure limit (PEL) is **3 ppm** averaged over an 8-hour workshift.
- NIOSH: The recommended airborne exposure limit (REL) is **3 ppm** averaged over a 10-hour workshift and **6 ppm**, which should not be exceeded during any 15-minute work period.
- ACGIH: The threshold limit value (TLV) is **0.5 ppm** averaged over an 8-hour workshift and **2 ppm**, which should not be exceeded at any time.

- ▶ **Arsenic Pentafluoride** is a 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 Hazardous Substance Fact Sheet, available on the RTK website (www.nj.gov/health/eoh/rtkweb) 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 and 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 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) and the PEOSH Hazard Communication Standard (N.J.A.C. 12:100-7) require 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

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

- ▶ Skin contact can cause irritation, burns, itching, rash and loss of pigment.
- ▶ Eye contact can cause irritation, burns, and red, watery eyes.
- ▶ Inhaling **Arsenic Pentafluoride** can irritate the nose and throat causing coughing and wheezing.
- ▶ Exposure to **Arsenic Pentafluoride** can cause weakness, poor appetite, nausea, vomiting, headache, muscle cramps, and even death.

Chronic Health Effects

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

Cancer Hazard

- ▶ **Arsenic Pentafluoride** is a CARCINOGEN in humans. There is evidence that *Arsenic compounds* cause skin, liver, and lung cancer in humans.
- ▶ Many scientists believe there is no safe level of exposure to a carcinogen.

Reproductive Hazard

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

Other Effects

- ▶ Repeated skin contact can cause thickened skin and/or patchy areas of darkening and loss of pigment. Some persons may develop white lines on the nails.
- ▶ Long-term exposure can cause an ulcer or hole in the "bone" (septum) dividing the inner nose, hoarseness and sore eyes.
- ▶ **Arsenic Pentafluoride** may damage the nervous system causing numbness, "pins and needles," and/or weakness in the hands and feet.
- ▶ **Arsenic Pentafluoride** may damage the liver.

Medical

Medical Testing

Before first exposure and every 12 months thereafter, OSHA requires your employer to provide (for persons exposed to greater than **0.005 mg/m³** of *Arsenic*) a work and medical history and exam which shall include:

- ▶ Chest x-ray
- ▶ Exam of the nose, skin and nails
- ▶ Test for urine *Arsenic*. This is most accurate at the end of the workday. Eating shellfish or fish may elevate *Arsenic* levels for up to two days. At NIOSH recommended exposure levels, urine *Arsenic* should not be greater than **100 micrograms per liter** of urine.

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.

OSHA requires your employer to provide you and your doctor with a copy of the OSHA *Inorganic Arsenic* Standard (29 CFR 1910.1018).

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

- ▶ More than light alcohol consumption can cause liver damage. Drinking alcohol can increase the liver damage caused by **Arsenic Pentafluoride**.

Conditions Made Worse By Exposure

- ▶ Many scientists believe that skin changes, such as thickening and pigment changes, make those skin areas more likely to develop skin cancer.

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/.

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 actions are required for this chemical by OSHA. Refer to the OSHA *Inorganic Arsenic* Standard (29 CFR 1910.1018) and the *Compressed Gases* Standard (29 CFR 1910.101).
- ▶ Where possible, transfer **Arsenic Pentafluoride** from cylinders or other containers to process containers in an enclosed system.

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 **Arsenic Pentafluoride**. Wear personal protective equipment made from material which can not be permeated or degraded by this substance. Safety equipment suppliers and manufacturers can provide recommendations on the most protective glove and clothing material for your operation.

- ▶ Safety equipment manufacturers recommend Barrier®, Teflon®, and Kel-F® gloves for *Hydrogen Fluoride*, and Tychem® Responder® and TK, and Trelchem® HPS, or the equivalent, as protective clothing materials for *Hydrogen Fluoride*.
- ▶ All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

Eye Protection

- ▶ Wear non-vented, impact resistant goggles when working with fumes, gases, or vapors.
- ▶ 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 implemented 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 over **0.5 ppm** (as *Hydrogen Fluoride*) or **0.002 mg/m³** (as Arsenic), use a NIOSH approved full facepiece respirator with an acid gas cartridge and high efficiency prefilters. Increased protection is obtained from full facepiece powered-air purifying respirators.
- ▶ Leave the area immediately if (1) while wearing a filter or cartridge respirator you can smell, taste, or otherwise detect **Arsenic Pentafluoride**, (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.
- ▶ Consider all potential sources of exposure in your workplace. You may need a combination of filters, prefilters or cartridges to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.
- ▶ Where the potential for high exposure exists, use a NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus or an emergency escape air cylinder.
- ▶ Exposure to **30 ppm** (as *Hydrogen Fluoride*) is immediately dangerous to life and health. If the possibility of exposure above **30 ppm** (as *Hydrogen Fluoride*) 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).

- ▶ Stop flow of gas and use fine water spray to disperse and knock down acid vapors.
- ▶ Extinguish fire using an agent suitable for type of surrounding fire. **Arsenic Pentafluoride** itself does not burn.
- ▶ POISONOUS GASES ARE PRODUCED IN FIRE, including *Hydrogen Fluoride and Arsenic*.
- ▶ CONTAINERS MAY EXPLODE IN FIRE.
- ▶ Use water spray to keep fire-exposed containers cool.

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 **Arsenic Pentafluoride** is leaked, take the following steps:

- ▶ Evacuate personnel and secure and control entrance to the area.
- ▶ Eliminate ignition sources.
- ▶ Ventilate area of leak to disperse the gas.
- ▶ Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.
- ▶ Use water spray to knock down vapors.
- ▶ Turn leaking cylinder with leak up to prevent escape of gas in liquid state.
- ▶ It may be necessary to contain and dispose of **Arsenic Pentafluoride** 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 **Arsenic Pentafluoride** you should be trained on its proper handling and storage.

- ▶ A regulated, marked area should be established where **Arsenic Pentafluoride** is handled, used or stored as required by the OSHA *Inorganic Arsenic* Standard (29 CFR 1910.1018).
- ▶ **Arsenic Pentafluoride** reacts with WATER; MOIST AIR; STEAM; and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to form toxic *Hydrogen Fluoride and Arsenic Pentoxide*.
- ▶ **Arsenic Pentafluoride** reacts violently with DIACETYLENE.
- ▶ **Arsenic Pentafluoride** is not compatible with REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); ORGANIC MATERIALS; and MATERIALS containing SILICA (such as GLASS).

- ▶ **Arsenic Pentafluoride** reacts with NICKEL; NICKEL ALLOYS; and COPPER in the presence of SULFUR DIOXIDE.
- ▶ Store in tightly closed containers in a cool, well-ventilated area.
- ▶ DO NOT let storage temperatures exceed 125°F (52°C).

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
 PO Box 368
 Trenton, NJ 08625-0368
 Phone: 609-984-2202
 Fax: 609-984-7407
 E-mail: rtk@doh.state.nj.us
 Web address: <http://www.nj.gov/health/eoh/rtkweb>

***The Right to Know Hazardous Substance Fact Sheets
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 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.

Acute Exposure Guideline Levels (AEGLs) are established by the EPA. They describe the risk to humans resulting from once-in-a-lifetime, or rare, exposure to airborne 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.

The **critical temperature** is the temperature above which a gas cannot be liquefied, regardless of the pressure applied.

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.

Emergency Response Planning Guideline (ERPG) values provide estimates of concentration ranges where one reasonably might anticipate observing adverse effects.

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 on human health effects that may result from exposure to various chemicals, maintained by federal EPA.

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/m³ 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.

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

Protective Action Criteria (PAC) are values established by the Department of Energy and are based on AEGLs and ERPGs. They are used for emergency planning of chemical release events.

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 *Air*), at the same temperature and pressure.

The **vapor pressure** is a force exerted by the vapor in equilibrium with the solid or liquid phase of the same substance. The higher the vapor pressure the higher concentration of the substance in air.

Common Name: **ARSENIC PENTAFLUORIDE**

Synonyms: Arsenic Fluoride

CAS No: 7784-36-3

Molecular Formula: AsF₅

RTK Substance No: 4171

Description: Colorless gas that forms white fumes in air

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health 0 - Fire 1 - Reactivity DOT#: UN 1955 ERG Guide #: 123 Hazard Class: 2.3 (Poison Gas)	Stop flow of gas and use fine water spray to disperse and knock down acid vapors. Extinguish fire using an agent suitable for type of surrounding fire. Arsenic Pentafluoride itself does not burn. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Fluoride</i> and <i>Arsenic</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.	Arsenic Pentafluoride reacts with WATER; MOIST AIR; STEAM; and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to form toxic <i>Hydrogen Fluoride</i> and <i>Arsenic Pentoxide</i> . Arsenic Pentafluoride reacts violently with DIACETYLENE. Arsenic Pentafluoride is not compatible with REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); ORGANIC MATERIALS; and MATERIALS containing SILICA (such as GLASS). Arsenic Pentafluoride reacts with NICKEL; NICKEL ALLOYS; and COPPER in the presence of SULFUR DIOXIDE.

SPILL/LEAKS

Isolation Distance:

Small Spill: 100 meters (300 feet)

Large Spill: 800 meters (1/2 mile)

Fire: 800 meters (1/2 mile)

Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.

Use water spray to knock down vapors.

Turn leaking cylinder with leak up to prevent escape of gas in liquid state.

PHYSICAL PROPERTIES

Flash Point:	Noncombustible
Vapor Density:	5.86 (air = 1)
Vapor Pressure:	>760 mm Hg at 68°F (20°C)
Specific Gravity:	6.27 (water = 1)
Water Solubility:	Decomposes
Boiling Point:	-63°F (-53°C)
Freezing Point:	-112°F (-80°C)
Molecular Weight:	169.9

EXPOSURE LIMITS

OSHA: 3 ppm, 8-hr TWA

NIOSH: 3 ppm, 10-hr TWA; 6 ppm, 15-min Ceiling

ACGIH: 0.5 ppm, 8-hr TWA; 2 ppm, Ceiling

IDLH: 30 ppm

The Protective Action Criteria values are:

PAC-1 = 1 ppm PAC-2 = 24 ppm PAC-3 = 44 ppm

(All of the above are for *Hydrogen Fluoride*)

PROTECTIVE EQUIPMENT

Gloves:	Barrier®, Teflon® and Kel-F® (>8-hr breakthrough for <i>Hydrogen Fluoride</i>)
Coveralls:	Tychem® Responder® and TK; and Trelchem® HPS (>8-hr breakthrough for <i>Hydrogen Fluoride</i>)
Respirator:	SCBA

HEALTH EFFECTS

Eyes:	Irritation, burns, red and watery eyes
Skin:	Irritation, burns, itching, rash and loss of pigment
Inhalation:	Nose and throat irritation with coughing, wheezing and hoarseness Weakness, headache, nausea, vomiting, and muscle cramps
Chronic:	<i>Arsenic compounds</i> cause skin, liver, and lung cancer in humans

FIRST AID AND DECONTAMINATION

Remove the person from exposure.
Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.
Immediately flush with large amounts of water. Apply 2.5% *Calcium Gluconate* gel to the affected skin. Seek medical assistance immediately.
Begin artificial respiration if breathing has stopped and CPR if necessary.
Transfer to a medical facility.