Common Name: **PHTHALIC ANHYDRIDE**

Synonyms: 1,2-Benzedicarboxylic Anhydride; 1,3-Dioxophthalon

Chemical Name: 1,3-Isobenzofurandione

Date: August 2001  Revision: April 2010

**Description and Use**

**Phthallic Anhydride** is a colorless to white, crystalline (sand-like) or needle-shaped solid, or a pale yellow liquid when in molten form, with a strong, choking odor. It is used to make plastics, resins, dyes, pharmaceuticals and fungicides.

- **ODOR THRESHOLD** = 0.053 ppm
- Odor thresholds vary greatly. Do not rely on odor alone to determine potentially hazardous exposures.

**Reasons for Citation**

- **Phthallic Anhydride** is on the Right to Know Hazardous Substance List because it is cited by OSHA, ACGIH, DOT, NIOSH, DEP, IRIS, NFPA and EPA.
- This chemical is on the Special Health Hazard Substance List.

**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**

- Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water. Seek medical attention.

**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

**Hazard Summary**

<table>
<thead>
<tr>
<th>Hazard Rating</th>
<th>NJDOH</th>
<th>NFPA</th>
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<td>REACTIVITY</td>
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</table>

**EMERGENCY RESPONDERS >>>> SEE LAST PAGE**

Hazard Rating Key: 0=Minimal; 1=Slight; 2=Moderate; 3=Serious; 4=Severe

- **Phthallic Anhydride** can affect you when inhaled.
- Contact can severely irritate and burn the skin and eyes.
- Inhaling **Phthallic Anhydride** can irritate the nose, throat and lungs.
- **Phthallic Anhydride** may cause a skin allergy and an asthma-like allergy.
- **Phthallic Anhydride** may damage the liver and kidneys.

**Workplace Exposure Limits**

OSHA: The legal airborne permissible exposure limit (PEL) is **12 mg/m^3** averaged over an 8-hour workshift.

NIOSH: The recommended airborne exposure limit (REL) is **6 mg/m^3** averaged over a 10-hour workshift.

ACGIH: The threshold limit value (TLV) is **6 mg/m^3** averaged over an 8-hour workshift.
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

### Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to Phthallic Anhydride:

- Contact can severely irritate and burn the skin and eyes.
- Inhaling Phthallic Anhydride can irritate the nose, throat and lungs causing coughing, wheezing and/or shortness of breath.

### Chronic Health Effects

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

#### Cancer Hazard
- While Phthallic Anhydride has been tested, it is not classifiable as to its potential to cause cancer.

#### Reproductive Hazard
- At doses that are severely toxic to the mother, Phthallic Anhydride produces teratogenic effects in animals.

### Other Effects

- Phthallic Anhydride may cause a skin allergy. If allergy develops, very low future exposure can cause itching and a skin rash.
- Phthallic Anhydride may cause an asthma-like allergy. Future exposure can cause asthma attacks with shortness of breath, wheezing, coughing, and/or chest tightness.
- Phthallic Anhydride can irritate the lungs. Repeated exposure may cause bronchitis to develop with coughing, phlegm, and/or shortness of breath.
- Phthallic Anhydride may damage the liver and kidneys.

Medical

**Medical Testing**

For frequent or potentially high exposure (half the PEL or greater), the following are recommended before beginning work and at regular times after that:

- Lung function tests

If symptoms develop or overexposure is suspected, the following are recommended:

- Evaluation by a qualified allergist can help diagnose skin allergy.
- Liver and kidney function tests

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

- Smoking can cause heart disease, lung cancer, emphysema, and other respiratory problems. It may worsen respiratory conditions caused by chemical exposure. Even if you have smoked for a long time, stopping now will reduce your risk of developing health problems.
- More than light alcohol consumption can cause liver damage. Drinking alcohol may increase the liver damage caused by Phthallic Anhydride.
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:

- For solid Phthallic Anhydride use a vacuum or slightly moisten to reduce dust during clean-up. DO NOT DRY SWEEP.

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 Phthallic Anhydride. Wear personal protective equipment made from material which cannot 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 Silver Shield®/4H® for gloves, Tyvek® (for solid Phthallic Anhydride), and Tychem® CPF3, BR, Responder® and TK; and Trellchem HSP and VPS, or the equivalent, as protective clothing materials for liquid Anhydrides, alicyclic.
- All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

Eye Protection

- Wear eye protection with side shields or 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 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 6 mg/m³, use a NIOSH approved full facepiece respirator with an organic vapor cartridge and particulate 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 Phthallic Anhydride, (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 exists for exposure over 12 mg/m³, 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 60 mg/m³ is immediately dangerous to life and health. If the possibility of exposure above 60 mg/m³ 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).

- Phthallic Anhydride may burn, but does not readily ignite.
- Use dry chemical, CO₂, water spray or alcohol-resistant foam as extinguishing agents.
- DO NOT use solid streams of water.
- POISONOUS GASES ARE PRODUCED IN FIRE, including Phthallic Acid.
- Use water spray to keep fire-exposed containers cool.
- Phthallic Anhydride may form an ignitable dust/air mixture in closed tanks or containers.
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 Phthallic Anhydride is spilled or leaked, take the following steps:

- Evacuate personnel and secure and control entrance to the area.
- Eliminate all ignition sources.
- Slightly moisten spilled solid material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.
- For molten (liquid) Phthallic Anhydride, cover with dry lime, sand or soda ash and place into sealed containers for disposal.
- Ventilate and wash area after clean-up is complete.
- It may be necessary to contain and dispose of Phthallic Anhydride 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 Phthallic Anhydride you should be trained on its proper handling and storage.

- Phthallic Anhydride reacts slowly with WATER to form Phthalic Acid and heat. The reaction may be violent.
- Phthallic Anhydride reacts violently on heating with COPPER OXIDE or SODIUM NITRITE causing an explosion hazard.
- Phthallic Anhydride is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); AMINES; ALCOHOLS; and AMMONIA.
- Store in tightly closed containers in a cool, well-ventilated area away from HEAT and WATER.
- Sources of ignition, such as smoking and open flames, are prohibited where Phthallic Anhydride is used, handled, or stored in a manner that could create a potential fire or explosion hazard.
- Phthallic Anhydride is corrosive to metals in the presence of WATER.
- Molten (liquid) Phthallic Anhydride should be stored under an inert atmosphere.
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:** Phthalic Anhydride

**Synonyms:** 1,2-Benzendicarboxylic Anhydride; 1,3-Dioxophthalon; 1,3-Isobenzofurandione

**CAS No:** 85-44-9

**Molecular Formula:** C₈H₄O₃

**RTK Substance No:** 1535

**Description:** Colorless to white, crystalline or needle-shaped solid, or a pale liquid when in molten form, with a strong, choking odor.

**HAZARD DATA**

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<th>Hazard Rating</th>
<th>Firefighting</th>
<th>Reactivity</th>
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<tr>
<td>3 - Health</td>
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<tr>
<td>1 - Fire</td>
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<td>0 - Reactivity</td>
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**DOT#:** UN 2214

**ERG Guide #:** 156

**Hazard Class:** 8 (Corrosive)

**SPILL/LEAKS**

**Isolation Distance:**
- Spills: 25 meters (75 feet)
- Fire: 800 meters (1/2 mile)

Slightly moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

For molten (liquid) Phthalic Anhydride, cover with dry lime, sand or soda ash and place into sealed containers for disposal.

Neutralize water spill with crushed limestone, soda ash or sodium bicarbonate.

**PHYSICAL PROPERTIES**

- **Odor Threshold:** 0.053 ppm
- **Flash Point:** 305°F (152°C)
- **LEL:** 1.7%
- **UEL:** 10.5%
- **Auto Ignition Temp:** 1,058°F (570°C)
- **Vapor Density:** 5.1 (air = 1)
- **Vapor Pressure:** 0.0002 mm Hg at 68°F (20°C)
- **Specific Gravity:** 1.5 (flake) 1.2 (molten) (water = 1)
- **Water Solubility:** Slightly soluble (decomposes)
- **Boiling Point:** 563°F (295°C)
- **Melting Point:** 267°F (131°C)
- **Ionization Potential:** 10 eV
- **Molecular Weight:** 148.1

**EXPOSURE LIMITS**

- **OSHA:** 12 mg/m³ (2 ppm), 8-hr TWA
- **NIOSH:** 6 mg/m³ (1 ppm), 10-hour TWA
- **ACGIH:** 6 mg/m³ (1 ppm), 8-hour TWA
- **IDLH:** 60 mg/m³

The Protective Action Criteria values are:
- PAC-1 = 12 mg/m³
- PAC-2 = 40 mg/m³
- PAC-3 = 60 mg/m³

**PROTECTIVE EQUIPMENT**

- **Gloves:** SilverShield®/4H® (>4-hr breakthrough)
- **Coveralls:** Tyvek® (for solid Phthalic Anhydride) and Tychem® CPF3, BR, Responder® and TK; and Trellchem HPS and VPS (>8-hr breakthrough for liquid Anyhydrides, alicyclic)
- **Respirator:** >6 mg/m³ - full facepiece APR with Organic vapor and High efficiency particulate cartridges
  >12 mg/m³ - SCBA

**FIRST AID AND DECONTAMINATION**

- **Eyes:** Irritation and burns
- **Skin:** Irritation and burns
- **Inhalation:** Nose and throat irritation with coughing and wheezing

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.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility.

April 2010