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Introduction:

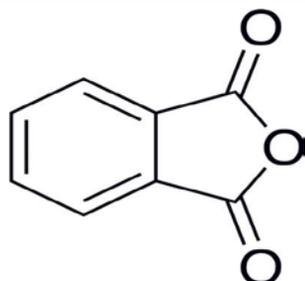
- ❖ As Thirumalai Chemicals Limited, we have continually committed to protecting our society and the environment by safe with care operational manufacturing base capable and are delivering quality products with excellent logistics and technical support.
- ❖ Phthalic Anhydride is an important aromatic di-carboxylic acid anhydride, which is widely used in the manufacture of Alkyd Resins for paints, Inks and Coatings, Unsaturated Polyester Resins, Plasticizers and Pigments.
- ❖ Phthalic anhydride is also used as an intermediate in the production of the alcoholysis reaction as the basis of the manufacture of phthalate esters, which are widely, used plasticizers.



Product Stewardship Summary

Phthalic Anhydride

Description and properties



Phthalic Anhydride is an aromatic di-carboxylic acid anhydride

Explosive property:

Phthalic Anhydride does not contain a chemical moiety suggesting a potential for explosivity.

No flammability in contact with water:

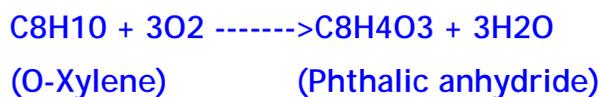
The chemical structure of the substance does not contain metals or metalloids.

Phyrophoric property:

Experience in production or handling shows that the substance does not ignite spontaneously on coming into contact with air at normal temperatures (i.e. the substance is known to be stable at room temperature for prolonged periods of time)



Phthalic Anhydride does not contain a chemical moiety suggesting an oxidising potential. The technology for the production of Phthalic anhydride (PA) is based on the oxidation of Ortho-Xylene (OX) in the gaseous phase with air in the presence of suitable catalyst (fixed bed vanadium based). The main reaction is as follows:



The technology for the production of Phthalic anhydride is based on the well-known (Gibbs) process consisting of:

Oxidation of O-Xylene by means of a fixed bed catalyst (installed inside the reaction tubes). The feed material is delivered to the reactors through pipes. Phthalic anhydride is recovered by de-sublimation into switch condensers units.

Purification is based on heat treatment and distillation/purification section operating under vacuum. The exhausted gas is cleaned by suitable technology in accordance to the respective national legislation. High and low-end distillation products are subject to controlled incineration (thermal feedstock for power supply). Aqueous scrubbers convert any Phthalic anhydride present to Phthalic acid, treated as effluent.



Product Stewardship Summary
Phthalic Anhydride

In addition to the oxidation of o-xylene naphthalene is also used as a feedstock for production of Phthalic anhydride. Naphthalene is reacted with oxygen to produce phthalic anhydride with carbon dioxide and water by products.

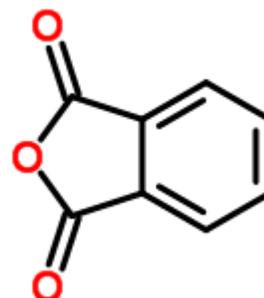
The product can be sold in molten state as well as in flakes (solid). If production is in the molten form, where the liquid phthalic anhydride is transferred by sealed heated pipeline to tanker containers, at approximately 170°C. Phthalic anhydride is maintained in the liquid state (i.e. above the melting point of 131.6°C) in the tanker container during transport by either steam jacket or internal heating. The intrinsic heat hazard of the liquid form and the need to keep it as a liquid dictates that it is retained within sealed pipelines and vessels at all times.

The flaked product is produced from a cooled thin film of the liquid (either via a conveyor belt or metal drum), and the flakes are produced from the cooled film by means of a blade. Flaking machines are with LEV equipment to prevent exposure to dusts.

Alternatively, exhausts from the LEV may be fed back to the molten stream, or passed through aqueous scrubbers to convert the phthalic anhydride to phthalic acid.



GHS07	GHS05	GHS08
		



Product Stewardship Summary**Phthalic Anhydride****Health Information**

Phthalic anhydride is metabolized in humans to phthalic acid. No conjugate formation was observed. .

Phthalic anhydride is not corrosive

Skin irritation/corrosion and eye irritation is covered by several studies. The most reliable studies for skin irritation stated the test substance as slightly/moderately irritating. A valid eye irritation study stated phthalic anhydride as moderately irritating.

No studies for dermal repeated dose available - by oral application phthalic anhydride is of low systemic toxicity. Phthalic anhydride is rapidly hydrolysed to phthalic acid in contact with water, due to the ionic character of this compound only a marginal penetration though the skin barrier is expected

For humans, phthalic anhydride in the form of vapour, fumes, or dust is a primary irritant to mucous membranes and the upper respiratory tract. Initial exposure produce coughing, sneezing, burning sensations in the nose and throat, and increased mucous secretion.



Product Stewardship Summary

Phthalic Anhydride

Environmental Information:

- ❖ Experiments on photochemical transformations of phthalic anhydride in various aquatic media were conducted in a photochemical reactor and in natural sunlight (Bajt, 1992). The photochemical reactions of phthalic anhydride, which hydrolyses to phthalic acid in water, showed polymerisation to polyphenyl. Kinetic studies of photochemical transformations of phthalic anhydride in all aqueous media revealed the occurrence of first order reactions with different rate constants.
- ❖ Phthalic anhydride has to be classified as readily biodegradable and is regarded as inherent biodegradable. The hydrolysis product phthalic acid is also readily biodegradable.



Product Stewardship Summary**Phthalic Anhydride**

Estimations on the degradation rates for sediment and soil are not carried out, as the substance and its hydrolysis product phthalic acid are readily biodegradable and therefore, it is concluded, that the substances are not persistent in the environment. As in general ionised organic substances do not readily diffuse across respiratory surfaces and phthalic acid is significantly deprotonated at physiological conditions (pH 3-9), it is expected that the substance has no significant potential for bioaccumulation in aquatic organisms.

The hydrolysis product phthalic acid indicate no significant potential for bioaccumulation of both substances in aquatic organisms. Studies demonstrates the relatively low potential for bioaccumulation of phthalic acid in plants.

Regulatory Information

Requirements may exist that govern the manufacture, importation, sale, transportation, use, and / or disposal of Phthalic Anhydride or products containing them. These requirements may vary by jurisdiction. For more information, consult the relevant Material Safety Data Sheet (MSDS) or contact us.



Product Stewardship Summary**Phthalic Anhydride****Exposure Potential**

Phthalic anhydride is a known skin and respiratory sensitizer and is assigned the R-phrases R42/43 "may cause sensitisation by inhalation and skin contact".

Phthalic anhydride is considered an extreme skin and respiratory sensitizer and is allocated to the high hazard category for both routes of exposure.

Based on the chemical forms of phthalic anhydride, the most likely routes of exposure to phthalic anhydride are via dermal contact and inhalation.

Worker exposure considered to be negligible for the molten form as it remains enclosed due to the high temperatures. Worker exposure considered to be negligible for the flake form as flakes are produced in closed systems.

Production and handling of molten phthalic anhydride involves high temperatures, and high integrity contained systems with little or no potential for exposure. Pipelines and vessels are sealed and insulated.



Product Stewardship Summary
Phthalic Anhydride

Workers involved in production work in a control room, with no direct contact to the installations housing the material. Workers involved in sampling and transfer of materials to road tankers are trained in the procedures and protective equipment is intended to cope with the worst-case scenario, in order to minimise exposure and risks.

Specially contained systems are used to transport molten liquid form phthalic anhydride and trained workers wear respirators and chemical resistant clothing and boots where required. LEV is generally employed where required in indoor applications and gas displacement systems may be used in tanker filling under hoods takes place.



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