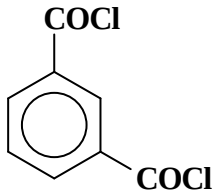
Technical Information

DuPont Protection Technologies



Isophthaloyl Chloride (ICL)

m-Phthaloyl Chloride

CAS Reg. No. 99-63-8

Isophthaloyl chloride (ICL) is a difunctional acid chloride with a variety of uses in polymer and fiber applications. It is a clear water-white liquid above its freezing point, and a white crystalline solid at room temperature. Mixes of isophthaloyl chloride (ICL) and terephthaloyl chloride (TCL) are available on request. DuPont offers ICL in cast form in drums, and in tank trucks and isotanks as a molten liquid. ICL is soluble in methylene chloride and other organic solvents.

Specifications

ICL Cast Technical	
Isophthaloyl Chloride, % min.	99.0
Terephthaloyl Chloride, ppm max.	8,000

ICL Molten	
Isophthaloyl Chloride, % min.	99.5
Terephthaloyl Chloride, ppm max.	3,000
Total monofunctionals, ppm max.	900
p-Cymene. ppm max.	30

Uses and Benefits

ICL is used as an intermediate in the manufacture of aramid fibers and various polymers including polycarbonates, polyesters and polyarylates. ICL imparts temperature stability, chemical resistance, and flammability resistance.

ICL also finds use as an effective stabilizer for urethane prepolymers due to its ability to scavenge water and maintain acid stability. Less ICL is needed because the molecule is bifunctional, and ICL can be handled with no significant odor problem.

ICL/TCL Blends

DuPont is uniquely capable of supplying mixes of the acid chlorides, ICL and TCL. These mixes in varying proportions are used in porous membranes and as polymer intermediates.

Contact DuPont for further information on terephthaloyl chloride (TCL) or ICL/TCL blends.

Typical Physical Properties*

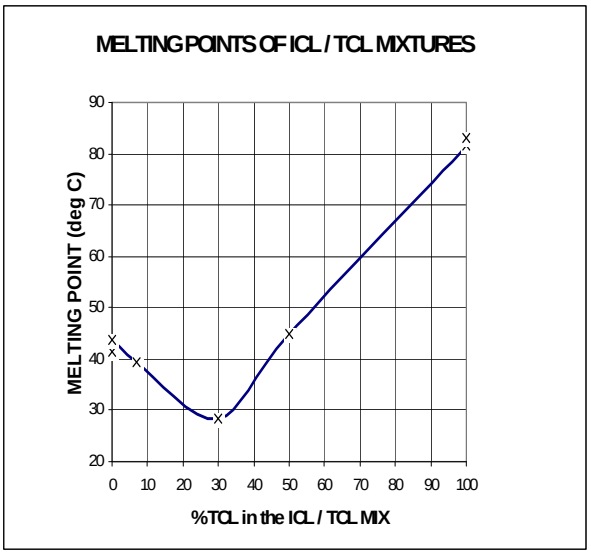
Property		Typical Value
Molecular Weight		203.0
Specific Gravity at 50°C (122°F)		1.388
Boiling Point (760 mm Hg), °C (°F)		269 (516)
Melting Point, C° (F°),		42-44 (107-111)
Vapor Pressure, mm Hg	@ 25°C (solid)	0.03
	@ 37.7°C (solid)	0.06
	@ 100°C (212°F)	1.7
	@ 200°C (392°F)	110
Viscosity, Centipoise	@ 60 °C	2.40
	@ 100 °C	1.40
	@ 150 °C	0.80
Flash Point, Cleveland Open Cup, °C (°F)		156 (313)
Formula		$C_6H_4(COCl)_2$

* These properties are drawn from various DuPont and other literature sources. DuPont does not make any warranty, express or implied, that future production will demonstrate these typical properties.

Formulating Information

New physical properties can be obtained for products that use ICL and TCL by using various blends of ICL / TCL. The following table shows the melting points of ICL / TCL mixtures that can be provided by special request.

Melting Properties of ICL / TCL Mixtures



Personal Safety and First Aid

Health Hazards

Isophthaloyl chloride is a strong irritant to eyes, skin and lungs. ICL may react with moisture to release hydrochloric acid, which may cause skin and eye burns. DuPont recommended exposure limits can be found in the latest DuPont ICL Safety Data Sheet (SDS).

Safety Precautions

Avoid contact of isophthaloyl chloride with eyes, skin, and clothing. Avoid breathing vapor or dust. Use isophthaloyl chloride in a closed system with adequate external ventilation.

First Aid

In case of eye contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician. For skin, wash immediately with soap and water. Call a physician. Wash contaminated clothing before reuse. See the latest DuPont ICL Safety Data Sheet for additional information.

Personal Protective Equipment

The following personal protective equipment should be available and worn as appropriate for the exposure conditions: chemical splash goggles; safety glasses with side shields; full-length face shield; hard hat with brim; butyl rubber or nitrile rubber gauntlet gloves if liquid contact is possible; neoprene gloves for routine work; butyl rubber pants, jacket, apron, and footwear; approved respiratory protection. See the latest DuPont ICL Safety Data Sheet for additional information.

Storage and Handling

Isophthaloyl chloride is corrosive to steel. It is handled hot as a liquid with a freezing point of 42-44 ^{o}C (107-111 ^{o}F). It will burn and is thermally stable at temperatures up to 400 ^{o}C (752 ^{o}F). Exposure of isophthaloyl chloride to high temperatures or contact with water may release hazardous hydrogen chloride gas (hydrochloric acid).

Steel storage tanks with Heresite®, phenolic linings are satisfactory for bulk storage. Storage tanks should be blanketed with nitrogen to protect product quality. Pressure transfers should likewise be done with nitrogen. Tanks should be heated with external steam heating panels, an oil circulation system or electrical tracing and insulated to allow control of tank contents in the range of 65 to 70 ^{o}C (149-158 ^{o}F), approximately 22 ^{o}C (30 ^{o}F) above the freezing point. Tanks should not be heated with steam jackets to avoid possible contact of steam with isophthaloyl chloride through defects in the tank wall. Type 316L or Carpenter 20 stainless steel may be used for valves, piping and pumps. If iron pickup by the product is a problem, either Teflon® lined piping or Inconel® 600 should be considered for the piping system. The piping system and pumps should be heated and insulated to avoid freezing of the product. Because many plastics are dissolved by this product, Teflon® TFE or FEP fluorocarbon resins are the preferred materials for gaskets and packing.

Isophthaloyl chloride should be handled in totally enclosed equipment where possible, or in systems designed to avoid human contact. Where contact cannot be avoided, suitable personal protective equipment must be worn. In the event of a spill or a leak, admission to the area should be limited to trained personnel wearing full protective equipment, such as a butyl rubber chemical-proof air suit, with breathing air supplied.

Storing Drums

Drums should be stored in a cool, well-ventilated area, separated from other combustible and readily oxidizable materials, and the drums protected from physical damage. Fire protection with an automatic or remotely controlled sprinkler system or water deluge system should be considered**.**

Thawing Cast Drums

A specially designed warming oven or thaw box is required to liquify the solid isophthaloyl chloride cast in 300-lb (136.08 kg) and 540-lb (244.94 kg) net phenolic lined steel drums. Heat (not live steam) in the box should be automatically controlled and set at 65 ^{o}C (149 ^{o}F), approximately 22 ^{o}C (30 ^{o}F) above the melting point. An upper temperature limit for isophthaloyl chloride of 100 ^{o}C (212 ^{o}F) is recommended. Heating above this point should be prevented by positive instrument control and by using 10 psig steam as the heat source.

Drum bungs should be loosened before beginning the melting operation to prevent pressure buildup in the drums. Ventilation must be provided inside the thaw box to avoid the buildup of harmful vapor concentrations.

After melting, the drums of hot liquid must be moved and emptied in a manner to prevent breathing of the vapors and contact of the liquid with eyes, skin, or clothing and to avoid thermal burns from the hot drums or drum contents.

Drum Handling

The preferred method for unloading the hot liquid from drums is by pipe or flexible stainless steel dip hose connected to a vacuum receiver. As an alternate, the drum may be drained by gravity through pipe or hose. With this method it is advisable to install a shutoff valve at the drum. Do not use pressure on the drums for unloading. The use of drum pumps should be avoided.

The drums should be opened and dumped in a location provided with positive, forced ventilation so that contact with the product by personnel emptying drums is avoided. Used drums should be washed free of organic material before disposal.

Personnel handling drums, including those washing empty drums, should wear proper personal protective equipment (see Personal Protective Equipment section). Care must be taken to avoid contact of eyes, skin or clothing with this product. At the end of each shift, work clothes should be laundered and each operator should shower.

Hazard in Case of Fire

Molten isophthaloyl chloride is a Class IIIB combustible liquid (US classification). Its flash point of 156 ^{o}C (313 ^{o}F) is above the temperatures at which it is normally stored and handled. However, isophthaloyl chloride should be used and stored in areas of minimum fire hazard and protected from flames, sparks, and excessive heat. Storage tanks and equipment should be grounded. In the event of fire, fire-fighting personnel should wear respiratory protection with breathing air supplied and fight fires from upwind. Use water spray, foam, carbon dioxide, or dry chemicals to extinguish fires (See the latest DuPont ICL Safety Data Sheet for additional information.). Water or foam may cause frothing, so use with caution. Use water to cool containers or vessels exposed to fire. Exposure to water or intense heat will result in release of hazardous hydrochloric acid gas.

Smoke and fumes may be harmful when inhaled or in contact with the skin and therefore must be avoided. When contact with smoke and fumes cannot be avoided, wear full protective equipment, such as a butyl rubber chemical-proof air suit, with breathing air supplied.

Leaks and Spills

Leaks and spills should be cleaned up promptly. Hazardous hydrochloric acid gas and isophthaloyl chloride fumes may be present in the spill area. Keep all unprotected personnel far removed and upwind of the contaminated area. The leak or spill may be contained with an earth or sand dam. Allow the molten material to solidify and shovel the solid material into steel drums for disposal or recovery. After the solids are cleaned up, flush the spill area with water. The spill area and washings may be

neutralized with soda ash. Wear full protective equipment, such as a butyl rubber chemical-proof air suit, with breathing air supplied, to avoid contact with the product.

See the latest DuPont ICL Safety Data Sheet for additional information.

Packages

DuPont ships ICL in 540 lb (244.94 kg) phenolic lined steel drums, as well as 45 lb (22.7 kg) pails. ICL is also available in molten form in tank trucks and isotank by special request.

Hazard Classifications

See the latest DuPont ICL Safety Data Sheet for hazards classification information.

Waste Disposal

Comply with federal, state, and local regulations. If approved, may be incinerated, sent to an approved hazardous material disposal area, or transferred to a disposal contractor.

Visit Our Website

For additional information on ICL and related products including product applications, visit our website: http://www.dupont.com/specintermediates.

Order Placement and Product Information

United States

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DuPont China Ltd.	852 2734 5345 (Hong Kong)
E. I. DuPont India Ltd.	91-22-67515079
DuPont Kabushiki Kaisha (Japan)	81-3-5521-2615
DuPont (Korea) Inc.	82-2-2222-5468
DuPont Taiwan Ltd.	886-2-25144418

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