

Material Safety Data for: Dioctyl Phthalate

1. PRODUCT IDENTIFICATION

Name	1,2-benzenedicarboxylic acid, bis(2-ethylhexyl) ester
Synonyms	di(2-ethylhexyl)phthalate, DOP, DEHP, phthalic acid, bis(2-ethylhexyl) ester, & others
CAS#	117-81-7
Product Uses	plasticiser

2. INGREDIENTS

	%	TWAEV / TLV ppm / mg/m ³	LD ₅₀ ORAL	(mg/kg) SKIN	LC ₅₀ ppm INHALATION
Dioctyl Phthalate	100%	0.3 / 5	19,000	10,000	0.175*

*see 3b, below

3. (a) HAZARDS SUMMARY

Hazards, Quick Guide: reproductive toxin, possible carcinogen

Canada – WHMIS

Key:

D 2 B

B 2 – Flash Point <38°C, B 3 – Flash Point >38°C & <93°C

D 1 – Immediately Toxic, D 2 – Chronic Toxicity

C – Oxidising Substance, E – Corrosive

U.S.A. – HMIS

Key:

Health – 1, Fire – 1, Reactivity – 0

0=minimal, 1=slight, 2=moderate, 3=serious, 4=severe

3. (b) HAZARDS – TOXICITY

Effects, Acute Exposure

Skin Contact	little to no effect
Skin Absorption	slight; no toxic effects likely by this route
Eye Contact	may be a mild irritant
Inhalation	extremely low vapour pressure & high viscosity makes inhalation of vapour or mist unlikely
Ingestion	not known – low toxicity & very bitter taste makes ingestion unlikely

Effects, Chronic Exposure

General	kidney & liver enlargement after long-term ingestion by experimental animals; no adverse effect seen in rats inhaling 0.05mg/litre DOP for 28 days
Sensitising	not a sensitiser in humans or animals
Carcinogen/Tumorigen	experimental tumorigen & carcinogen (A3) in rodents; possible carcinogen (B2) in humans
Reproductive Effect	testicular atrophy, fetotoxin & teratogen in rodents & <i>in vitro</i> ; no known effect in humans
Mutagen	mutagen in rodents; no known effect on humans
Synergistic With	not known
LD ₅₀ (oral)	19,600mg/kg (rat), 26,000 & 30,000mg/kg (rat & mouse), >34,000mg/kg (rabbit), 26,000mg/kg (guinea pig), & others
LD ₅₀ (skin)	25,000mg/kg (rabbit), 10,000mg/kg (guinea pig)
LC ₅₀ (inhalation)	0.0006-0.011mg/m ³ (rat) (=0.095-0.175ppm)*

*NOTE: Airborne concentrations this high can only be achieved by evaporation at high temperature & cooling before administration.

*NOTE: Small amounts of phthalates can be absorbed from a variety of plastics by ingestion. Metabolism of phthalates can produce substances which mimic sex hormones – they are thought to be “anti androgens” – and may have effects on the developing fetus & young children. There are also weak (and unproven) statistical links to health effects such as obesity, insulin resistance, and attention deficit disorder. Although absorption via the skin is slight, even tiny amounts of phthalates may be able to produce harmful effects. Accordingly, take care to limit skin contact with this product.

Please note that the above is characteristic of phthalates in general, and does not depend on either the source or the manufacturer of the product.

Please ensure that this MSDS is given to, and explained to people using this product.

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4. FIRST AID

- SKIN: Wash with soap and plenty of water. Remove contaminated clothing and do not reuse until thoroughly cleaned or laundered.
- EYES: Wash eyes with plenty of water, holding eyelids open. Seek medical assistance promptly if there is irritation.
- INHALATION: Remove from contaminated area promptly. **CAUTION: Rescuer must not endanger himself!** If breathing stops, administer artificial respiration and seek medical aid promptly.
- INGESTION: Give plenty of water to dilute product. Do not induce vomiting (NOTE below). Keep victim quiet. If vomiting occurs, lower victim's head below hips to prevent inhalation of vomited material. Seek medical help promptly.

Inadvertent inhalation of vomited material may seriously damage the lungs. The danger of this is greater than the risk of poisoning through absorption of this relatively low-toxicity substance. The stomach should only be emptied under medical supervision, and after the installation of an airway to protect the lungs.

5. PHYSICAL PROPERTIES

Odour & Appearance	clear, viscous, colourless to pale yellow liquid with faint odour
Odour Threshold	not known
Vapour Pressure	7.2×10^{-8} mmHg / 9.6×10^{-9} kPa (25°C / 77°F); also given as 9.75×10^{-6} mmHg / 1.3 kPa (25°C / 77°F)
Evaporation Rate (<i>Butyl Acetate</i> = 1)	not known – not volatile
Vapour Density (air = 1)	approx 16 (theoretical)
Boiling Range	384°C / 723°F – also given as 230-239°C / 446-462°F (reduced pressure: 5-7 mmHg)
Freezing Point	-55°C / -67°F
Pour Point	-46°C / -51°F
Specific Gravity	0.986 (20/20°C)
Water Solubility	0.3 milligrams per litre (25°C / 77°F); also given as about 1/10 th of this – or almost nil
Also soluble in	ethanol, acetone, diethyl ether, aromatic hydrocarbons
Viscosity	81 centipoise (20°C / 68°F)
pH	none – (does not liberate hydrogen ions when dissolved)
Molecular Weight	390 grams per mole
Conversion Factor	1 ppm = 15.9 mg/m ³

6. FLAMMABILITY & FIRE FIGHTING

Flash Point	195-215°C / 383-419°F (open cup)
Autoignition Temperature	390°C / 734°F – values up to 410°C / 770°F are also given
Flammable Limits	lower 0.3% – upper limit not known
Combustion Products	carbon monoxide, nitrogen oxides, smoke, polycyclic aromatics, part oxidised hydrocarbon fragments, & phthalic anhydride (highly irritating & allergenic)
Fire Fighting Precautions	alcohol or polymer foam, dry chemical, water fog, water spray only to cool & dilute, water jet spreads flames; fire fighters must wear SCBA
Static Charge Accumulation	probably cannot accumulate a static charge

7. STABILITY / REACTIVITY

Dangerously Reactive With	strong oxidising agents; strong acids or strong alkalis; explosive with chlorine bleach
Also Reactive With	nitrates
Stability	stable; will not polymerize
Decomposes in Presence of	hydrolyses gradually under either alkaline or acidic conditions
Decomposition Products	none apart from Hazardous Combustion Products
Sensitive to Mechanical Impact	no

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8. PROTECTIVE EQUIPMENT / EXPOSURE CONTROL

ACGIH TLV	5mg/m ³
OSHA PEL	5mg/m ³
STEL	10mg/m ³
Ventilation	mechanical ventilation is probably not required due to very low vapour pressure
Hands	butyl or nitrile gloves may be worn – <i>consult supplier to confirm suitability</i>
Eyes	safety glasses with side shields – <i>always protect the eyes</i>
Clothing	no special protective clothing required

9. HANDLING & STORAGE

Store in a cool, dry environment, away from open flame and oxidising agents. Empty containers may contain a flammable / explosive vapour. Always ensure that containers, whether empty or full, or part full, are tightly sealed unless in use.

Avoid breathing product vapour or mist. Use with adequate ventilation.

Never cut, drill, weld or grind on or near this container. Avoid prolonged contact with skin and wash work clothes frequently. An eye bath and safety shower must be available near the workplace.

NOTE: Many phthalates appear to alter the action of sex hormones in the fetus and in young children. Although there is less evidence of an effect in adults, it is prudent to minimise skin contact with these substances. (see also NOTE in Part 3b)

10. SPILL PROCEDURES

Leak Precaution	dyke to control spillage and prevent environmental contamination
Handling Spill	ventilate contaminated area; recover free liquid with suitable pumps; absorb residue on an inert sorbent, sweep, shovel, & store in closed containers for recycling or disposal

11. DISPOSAL

Waste Disposal	do not flush to sewer , recycle solvent if possible, may be incinerated in approved facility with flue gas monitoring and scrubbing – after mixing with a suitable flammable waste
Containers	Drums should be reused. Recondition and pressure test by a licensed reconditioner prior to re-use. Pails must be vented and thoroughly dried prior to crushing and recycling. IBCs (intermediate bulk containers): polyethylene bottle must be pressure tested & recertified at 30 months. Replace at 60 months (5yrs). Steel containers must be inspected, pressure tested & recertified every 5 years. <i>Never cut, drill, weld or grind on or near this container, even if empty</i>

12. ENVIRONMENTAL INFORMATION

Bioaccumulation	although DOP should bioconcentrate, it is rapidly metabolised and cannot bioaccumulate
Biodegradation	this product degrades readily and rapidly in the presence of oxygen; biodegradation rates as rapid as complete degradation in 1-2 days to 1-3 weeks depending on test methods
Abiotic Degradation	this product reacts with atmospheric hydroxyl radicals; its estimated half-life in air is 18 hours
Mobility in soil, water	this product is water insoluble & adsorbs strongly to soil particles – it is immobile in soil & water
Aquatic Toxicity	
LC ₅₀ (Fish, 96hr)	>186mg/l (Carassius auratus), 0.17mg/l (Cyprinodon variegatus), 1.0-9.5mg/l (Lepomis macrochirus), 33-46mg/l (Micropterus salmoides), >0.3-19.5mg/l (Oncorhynchus mykiss), 0.3-10mg/l (Pimephelas promelas) & others
EC ₅₀ (Crustacea, 48hr)	0.3-100mg/l (Daphnia magna), & others
EC ₅₀ (Algae)	130mg/l (Scenedesmus subspicatus), 0.1mg/l (Selastrum capricornutum), 100mg/l (Gymnodium breve) & etc

NOTE: The toxicity data are exceptionally variable for fish, crustacea, & algae, probably reflecting the very low water solubility & the rapid biodegradability of DOP

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13. TRANSPORT REGULATIONS

Canada TDG	PIN	UN- 3082
AND	Shipping Name	environmentally hazardous substance, liquid N.O.S. (dioctyl phthalate)
U.S.A. 49 CFR	Class	9 (if shipped by water, add triangular marine pollutant safety mark)
	Packing Group	III
Marine Pollutant		P

Note that DOP is a marine pollutant despite rapid biodegradation & unremarkable ecotoxicity. This is likely due to the possibility that its breakdown products may include a hormone mimic which is bioactive at very low concentration.

14. EMERGENCY INFORMATION

Canada	Call CANUTEC (collect)	(613) 996-6666
U.S.A.	Call CHEMTREC	(800) 424-9300

15. REGULATIONS

Canada DSL	on inventory
U.S.A. TSCA	on inventory
Europe EINECS	on inventory (EC# 204-211-0)

Immediately Dangerous to Life or Health: NIOSH considers bis-(2-ethylhexyl)-phthalate to be a potential occupational carcinogen.

OSHA Standards: Permissible Exposure Limit: Table Z-1 8-hr Time Weighted Avg: 5mg/m³. Vacated 1989 OSHA PEL TWA 5mg/m³; STEL 10mg/m³ is still enforced in some states.

NIOSH Recommendations: NIOSH recommends that di-sec octyl phthalate be regulated as a potential human carcinogen. NIOSH recommends occupational exposures to carcinogens be limited to the lowest feasible concn. Recommended Exposure Limit: 10 Hr Time-Weighted Avg: 5mg/m³. Recommended Exposure Limit: 15 Min Short-Term Exposure Limit: 10mg/m³.

Threshold Limit Values: 8 hr Time Weighted Avg (TWA): 5 mg/cu m. Excursion Limit Recommendation: Excursions in worker exposure levels may exceed three times the TLV-TWA for no more than a total of 30 min during a work day, and under no circumstances should they exceed five times the TLV-TWA, provided that the TLV-TWA is not exceeded. A3; Confirmed animal carcinogen with unknown relevance to humans.

Atmospheric Standards: Listed as a hazardous air pollutant generally known or suspected to cause serious health problems. The Clean Air Act, as amended in 1990, directs EPA to set standards requiring major sources to sharply reduce routine emissions of toxic pollutants. EPA is required to establish and phase in specific performance based standards for all air emission sources that emit one or more of the listed pollutants. Bis(2-ethylhexyl)phthalate is included on this list.

Federal Drinking Water Standards: EPA 6 ug/l

State Drinking Water Standards: California 4 ug/l

State Drinking Water Guidelines: Minesota 20 ug/l, Maine 25 ug/l

Clean Water Act Requirements: Toxic pollutant designated pursuant to section 307(a)(1) of the Clean Water Act and is subject to effluent limitations. /Phthalate esters/

TSCA Requirements: Pursuant to section 8(d) of TSCA, EPA promulgated a model Health and Safety Data Reporting Rule. The section 8(d) model rule requires manufacturers, importers, and processors of listed chemical substances and mixtures to submit to EPA copies and lists of unpublished health and safety studies. 1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester is included on this list. A testing consent order is in effect for di-2-ethylhexyl phthalate for chemical fate testing. FR citation: 1/9/89.

RCRA Requirements: As stipulated in 40 CFR 261.33, when 1,2-benzenedicarboxylic acid, bis(2-ethylhexyl) ester, as a commercial chemical product or manufacturing chemical intermediate or an off-specification commercial chemical product or a manufacturing chemical intermediate, becomes a waste, it must be managed according to Federal and/or State hazardous waste regulations. Also defined as a hazardous waste is any residue, contaminated soil, water, or other debris resulting from the cleanup of a spill, into water or on dry land, of this waste. Generators of small quantities of this waste may qualify for partial exclusion from hazardous waste regulations (40 CFR 261.5).

FIFRA Requirements: As the federal pesticide law FIFRA directs, EPA is conducting a comprehensive review of older pesticides to consider their health and environmental effects and make decisions about their future use. Under this pesticide reregistration program, EPA examines health and safety data for pesticide active ingredients initially registered before November 1, 1984, and determines whether they are eligible for reregistration. In addition, all pesticides must meet the new safety standard of the Food Quality Protection Act of 1996. Pesticides for which EPA had not issued Registration Standards prior to the effective date of FIFRA, as amended in 1988, were divided into three lists based upon their potential for human exposure and other factors, with List B containing pesticides of greater concern and List D pesticides of less concern. Bis(2-ethylhexyl) phthalate is found on List C.

FDA Requirements: Dioctylphthalate an indirect food additive for use only as a component of adhesives.

16. PREPARATION INFORMATION

Prepared for Megaloid Laboratories by Peter Bursztyn, (705) 734-1577 File Name: DOP
 With data from RTECS, Haz. Substance Data Base, Cheminfo (CCOHS), IUCLID Datasheets (European Chem. Substance Info. System), & others, as available
 Preparation Date: **December 2003** Revision Date: **October 2006, October 2009**

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