

Technical Factsheet on: DI (2-ETHYLHEXYL) PHTHALATE (DEHP)

[List of Contaminants](#)

As part of the Drinking Water and Health pages, this fact sheet is part of a larger publication:
National Primary Drinking Water Regulations

Drinking Water Standards

MCLG: zero

MCL: 0.006 mg/L

HAL(child): none

Health Effects Summary

Acute: EPA has found di (2-ethylhexyl) phthalate (DEHP) to potentially cause the following health effects from acute exposures at levels above the MCL: mild gastrointestinal disturbances, nausea, vertigo.

Chronic: DEHP has the potential to cause the following health effects from long-term exposures at levels above the MCL: damage to liver and testes; reproductive effects.

Cancer: There is some evidence that DEHP may have the potential to cause cancer from a lifetime exposure at levels above the MCL.

Usage Patterns

DEHP is the most commonly used of a group of related chemicals called phthalates or phthalic acid esters. The greatest use of DEHP is as a plasticizer for polyvinylchloride (PVC) and other polymers including rubber, cellulose and styrene. A number of packaging materials and tubings used in the production of foods and beverages are polyvinyl chloride contaminated with phthalic acid esters, primarily DEHP.

It is also used widely in insect repellent formulations cosmetics, rubbing alcohol, liquid soap, detergents, decorative inks, lacquers, munitions, industrial and lubricating oils, defoaming agents during paper and paperboard manufactures, and as pesticide carriers, in photographic film, wire and cable, adhesives, as an organic vacuum pump fluid, a dielectric in capacitors.

Production of DEHP increased during the 1980s, from 251 million lbs in 1982 to over 286 million lbs. in 1986, with imports of 6 million lbs. In 1986, it was estimated that industries consumed DEHP as follows: plasticizer for polyvinyl chloride, 95%; other uses, 5%.

Release Patterns

DEHP is used in large quantities, primarily as a plasticizer for polyvinyl chloride and other polymeric materials. Disposal of these products (incineration, landfill, etc) will result in the release of DEHP into the environment. DEHP has been detected in the effluent of numerous industrial plants.

From 1987 to 1993, according to EPA's Toxic Chemical Release Inventory, DEHP releases to land and water totalled over 500,000 lbs., of which about 95 percent was to land. These releases were primarily from rubber and plastic hose industries. The largest releases (10% or more of the total) occurred in Wisconsin and Tennessee.

Environmental Fate

DEHP released to soil will neither evaporate nor leach into groundwater. DEHP has a strong tendency to adsorb to soil and sediments. Calculated log K_{oc} values of 4 to 5 have been reported. Experimental evidence demonstrates strong partitioning to clays and sediments (log K_{oc} = 4-5). Limited data is available to suggest that it may biodegrade in soil under aerobic conditions following acclimation.

DEHP released to water systems will biodegrade fairly rapidly (half-life 2-3 weeks) following a period of acclimation. It will also strongly adsorb to sediments (log K_{oc} 4 to 5). Evaporation and hydrolysis are not significant aquatic processes.

Atmospheric DEHP will be carried long distances and be removed by rain.

DEHP does have a tendency to bioconcentrate in aquatic organisms; the experimental BCF values range from a log of 2 to 4 in fish and invertebrates. In fathead minnows the log BCF was 2.93; in bluegill sunfish it was 2.06 .

Human exposure will occur in occupational settings and from air, from consumption of drinking water, food (especially fish etc, where bioconcentration can occur) and food wrapped in PVC, as well as during blood transfusions from PVC blood bags.

Chemical/ Physical Properties

CAS Number: 117-81-7

Color/ Form/Odor: Colorless oily liquid

M.P.: -50 C B.P.: 230 C (5 mm Hg)

Vapor Pressure: 1.32 mm Hg at 200 C

Octanol/Water Partition (K_{ow}): Log K_{ow} = 4.89

Density/Spec. Grav.: 0.99 at 20 C

Solubility: 0.285 mg/L of water at 24 C; Slightly soluble in water

Soil sorption coefficient: Log K_{oc} measured at 4 to 5; low mobility in soil

Odor/Taste Thresholds: N/A

Bioconcentration Factor: Log BCF = 2 to 4 in fish; expected to bioconcentrate in aquatic organisms.

Henry's Law Coefficient: 1x10⁻⁴ atm-cu m/mole

Trade Names/Synonyms: DEHP; Bis(2-ethylhexyl)-phthalate; BEHP; Dioctyl phthalate; Pittsburgh PX-138; Platinol AH; RC Plasticizer DOP; Reomol D79P; Sicol 150; Staflex DOP; Truflex DOP; Vestinol AH; Vinicizer 80; Palatinol AH; Hercoflex 260; Kodaflex DOP; Mollan O; Nuoplaz DOP; Octoil; Eviplast 80; Fleximel; Flexol DOP; Good-rite GP264; Hatcol DOP; Ergoplast FDO; DAF 68; Bisoflex 81

Other Regulatory Information

Monitoring For Ground/Surface Water Sources:

Initial Frequency- 4 quarterly samples every 3 years
Repeat Frequency- If no detections during initial round:
 2 quarterly per year if serving >3300 persons;
 1 sample per 3 years for smaller systems
Triggers - Return to Initial Freq. if detect at > 0.0006 mg/L

Analysis:

Reference Source Method Numbers

EPA 600/4-88-039 506; 525.2

Treatment- Best Available Technologies:
Granular Activated Charcoal

Toxic Release Inventory - Releases to Water and Land, 1987 to 1993 (in pounds):

	Water		Land
TOTALS	16,910		471,191
Top Five States*			
WI	500	255,000	
TN	3,491	80,419	
OH	268	62,982	
NJ	3,956	23,139	
NY	500	13,284	
Major Industries			
Misc rubber products		274	311,900
Rubber, plastic hose		10	80,019
Cyclic crudes, intermed.		3,099	12,200

* Water/Land totals only include facilities with releases greater than 100 lbs.

For Additional Information:

EPA can provide further regulatory and other general information:
EPA Safe Drinking Water Hotline - 800/426-4791

Other sources of toxicological and environmental fate data include:
Toxic Substance Control Act Information Line - 202/554-1404
Toxics Release Inventory, National Library of Medicine - 301/496-6531
Agency for Toxic Substances and Disease Registry - 404/639-6000