

Dibutyl Phthalate

84-74-2

Hazard Summary

Dibutyl phthalate is used in making flexible plastics that are found in a variety of consumer products. It appears to have relatively low acute (short-term) and chronic (long-term) toxicity. No information is available regarding the effects in humans from inhalation or oral exposure to dibutyl phthalate, and only minimal effects have been noted in animals exposed by inhalation. No studies are available on the reproductive, developmental, or carcinogenic effects of dibutyl phthalate in humans. Animal studies have reported developmental and reproductive effects from oral exposure. EPA has classified dibutyl phthalate as a Group D, not classifiable as to human carcinogenicity.

Please Note: The main sources of information for this fact sheet are EPA's Integrated Risk Information System (IRIS) (3), which contains information on oral chronic toxicity and the [RfD](#), and the Agency for Toxic Substances and Disease Registry's (ATSDR's) Toxicological Profile for Di-n-Butyl Phthalate.(1)

Uses

- Dibutyl phthalate is used to help make plastics soft and flexible. It is used in shower curtains, raincoats, food wraps, bowls, car interiors, vinyl fabrics, floor tiles, and other products. (1)

Sources and Potential Exposure

- The largest source of exposure to dibutyl phthalate is from food, possibly fish and seafood; levels in fish ranged from 78 to 200 parts per billion (ppb). (1)
- Dibutyl phthalate levels of 3.3 to 5.7 nanograms per cubic meter (ng/m^3) were detected in the air near New York City. Dibutyl phthalate levels in rooms recently covered with polyvinyl chloride tiles ranged from 15,000 to 26,000 ng/m^3 . (1)
- Dibutyl phthalate was detected in some drinking water supplies at levels ranging from 0.1 to 5 ppb. (1)

Assessing Personal Exposure

- Tests are available that can detect dibutyl phthalate in blood and body tissues, and the major breakdown products of dibutyl phthalate can be measured in urine. (1)

Health Hazard Information

Acute Effects:

- No information is available regarding the acute effects in humans from inhalation or oral exposure to dibutyl phthalate. (1)
- No information is available regarding acute effects in animals from inhalation exposure to dibutyl phthalate, and oral animal studies have reported minimal effects on the liver and a slight decrease in kidney weight. (1)
- Tests involving acute exposure of rats and mice have shown dibutyl phthalate to have [moderate](#) toxicity from inhalation exposure and [low](#) toxicity from oral exposure. (2)

Chronic Effects (Noncancer):

- No information is available regarding the chronic effects of dibutyl phthalate from inhalation or oral exposure in humans. (1)
- Limited information is available on the chronic effects of dibutyl phthalate in animals from inhalation exposure; one study reported decreased body weight gain and increased lung weight relative to body weight, and another study reported an increase in brain weight as a percent of body weight. (1)
- Chronic oral studies in animals have reported effects on the liver. (1)
- A 13-week oral study in animals reported reduced body weights, minimal anemia, and liver effects. (5) EPA has not established a Reference Concentration (RfC) for dibutyl phthalate. (3)
- The Reference Dose (RfD) for dibutyl phthalate is 0.1 milligrams per kilogram body weight per day (mg/kg/d) based on increased mortality in rats. The RfD is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily oral exposure to the human population (including sensitive subgroups) that is likely to be without appreciable risk of deleterious noncancer effects during a lifetime. It is not a direct estimator of risk but rather a reference point to gauge the potential effects. At exposures increasingly greater than the RfD, the potential for adverse health effects increases. Lifetime exposure above the RfD does not imply that an adverse health effect would necessarily occur. (3)
- EPA has low confidence in the study on which the RfD was based because the study used few animals of one sex only and it was not indicated whether the 50 percent mortality observed early in the study was considered treatment-related, nor was the cause of death indicated; low confidence in the database because the study is the only subchronic bioassay of dibutyl phthalate reported in the literature; and, consequently, low confidence in the RfD. (3)

Reproductive/Developmental Effects:

- No studies are available regarding the reproductive or developmental effects of dibutyl phthalate in humans from inhalation or oral exposure. (1)
- Animal studies have reported developmental effects, such as reduced fetal weight, decreased number of viable litters, and birth defects (neural tube defects) in mice exposed orally to dibutyl phthalate. Reproductive effects, such as decreased spermatogenesis and testes weight, have also been reported in oral animal studies. (1,5,6)

Cancer Risk:

- No information is available on the carcinogenic effects of dibutyl phthalate in humans or animals. (1)
- EPA has classified dibutyl phthalate as a Group D, not classifiable as to human carcinogenicity. (3)

Physical Properties

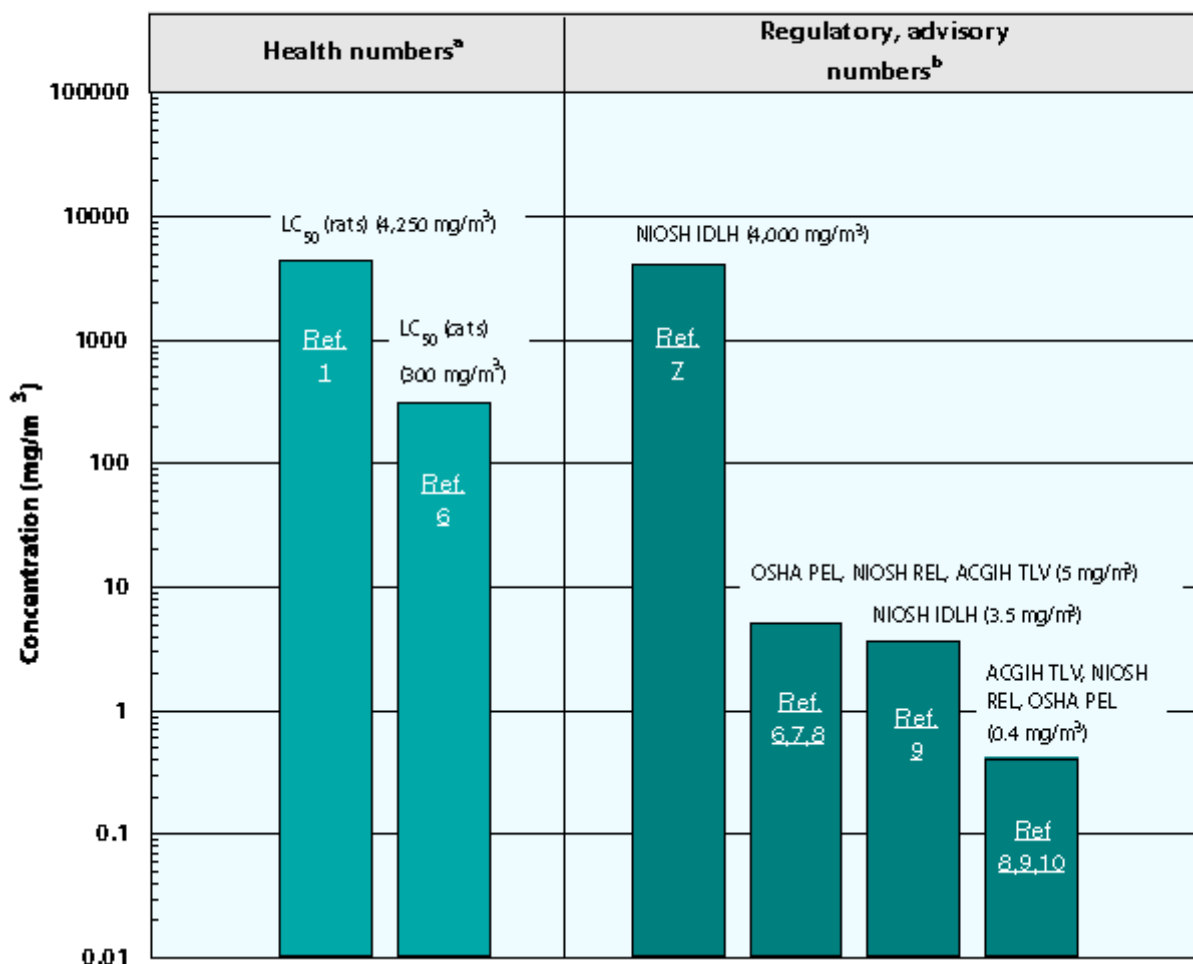
- Dibutyl phthalate is an odorless and colorless to faint yellow oily liquid. (1)
 - The chemical formula for dibutyl phthalate is $C_{16}H_{22}O_4$, and the molecular weight is 278.35 g/mol. (1)
 - The vapor pressure for dibutyl phthalate is 1.0×10^{-5} mm of Hg at 25 °C, and it has a log octanol/water partition coefficient ($\log K_{ow}$) of 5.60. (1)
 - Dibutyl phthalate is also known as di-n-butyl phthalate.
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Conversion Factors:

To convert concentrations in air (at 25 °C) from ppm to mg/m^3 : $mg/m^3 = (ppm) \times (\text{molecular weight of the compound}) / (24.45)$. For dibutyl phthalate: 1 ppm = 11.4 mg/m^3 .

Health Data from Inhalation Exposure

Di-n-butylphthalate



ACGIH TLV--American Conference of Governmental and Industrial Hygienists' threshold limit value expressed as a time-weighted average; the concentration of a substance to which most workers can be exposed without adverse effects.

LC₅₀ (Lethal Concentration₅₀)--A calculated concentration of a chemical in air to which exposure for a specific length of time is expected to cause death in 50% of a defined experimental animal population.

NIOSH IDLH -- National Institute of Occupational Safety and Health's immediately dangerous to life or health concentration; NIOSH recommended exposure limit to ensure that a worker can escape from an exposure condition that is likely to cause death or immediate or delayed permanent adverse health effects or prevent escape from the environment.

NIOSH REL--NIOSH's recommended exposure limit; NIOSH-recommended exposure limit for an 8- or 10-h time-weighted-average exposure and/or ceiling.

OSHA PEL--Occupational Safety and Health Administration's permissible exposure limit expressed as a time-weighted average; the concentration of a substance to which most workers can be exposed without adverse effect averaged over a normal 8-h workday or a 40-h workweek.

The health and regulatory values cited in this factsheet were obtained in December 1999.

^a Health numbers are toxicological numbers from animal testing or risk assessment values developed by EPA.

^b Regulatory numbers are values that have been incorporated in Government regulations, while advisory numbers are nonregulatory values provided by the Government or other groups as advice. OSHA numbers are regulatory, whereas NIOSH and ACGIH numbers are advisory.

References

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2. U.S. Department of Health and Human Services. Registry of Toxic Effects of Chemical Substances (RTECS, online database). National Toxicology Information Program, National Library of Medicine, Bethesda, MD. 1993.
3. U.S. Environmental Protection Agency. Integrated Risk Information System (IRIS) on Di-n-butyl Phthalate. National Center for Environmental Assessment, Office of Research and Development, Washington, DC. 1999.
4. U.S. Department of Health and Human Services. Hazardous Substances Data Bank (HSDB, online database). National Toxicology Information Program, National Library of Medicine, Bethesda, MD. 1993.
5. National Toxicology Program (NTP). Toxicity Studies of Dibutyl Phthalate (CAS No. 84-74-2) Administered in Feed to F344/N Rats and B6C3F1 Mice. Tox-30. 1995.
6. Occupational Safety and Health Administration (OSHA). Occupational Safety and Health Standards, Toxic and Hazardous Substances. Code of Federal Regulations. 29 CFR 1910.1000. 1998.
7. National Institute for Occupational Safety and Health (NIOSH). Pocket Guide to Chemical Hazards. U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention. Cincinnati, OH. 1997.
8. American Conference of Governmental Industrial Hygienists (ACGIH). 1999 TLVs and BEIs. Threshold Limit Values for Chemical Substances and Physical Agents. Biological Exposure Indices. Cincinnati, OH. 1999.