

4. PRODUCTION, IMPORT, USE, AND DISPOSAL

4.1 PRODUCTION

Diethyl phthalate is produced industrially by the reaction of phthalic anhydride with ethanol in the presence of concentrated sulfuric acid catalyst (Anonymous 1985; HSDB 1994). Phthalic anhydride is produced by either the oxo process or the Ald-Ox process from ethanol and the oxidation of naphthalene or o-xylene (Peakall 1975). The purity of manufactured phthalate esters is reportedly between 99.70% and 99.97% with the main impurities being isophthalic acid, terephthalic acid, and maleic anhydride (Peakall 1975). The U.S. production volume of diethyl phthalate gradually declined from approximately 21 million pounds in 1980 to 19 million pounds in 1987 (USITC 1981, 1988). Production volumes increased again in 1988 to 26 million pounds (Kamrin and Mayor 1991). Currently the four U.S. facilities that reportedly produce diethyl phthalate are Eastman Chemical Company (Kingsport, Tennessee), Reilly Industries, Inc. (Greensboro, North Carolina), BASF Corporation (Parsippany, New Jersey), and Huls America, Inc. (Piscataway, New Jersey) (HSDB 1994; SRI 1991). Since diethyl phthalate releases are not required to be reported under the Super-fund Amendments and Reauthorization Act (SARA) Section 313, there are no data on diethyl phthalate in the Toxics Release Inventory (TR188 1991, 1993).

4.2 IMPORT/EXPORT

U.S. imports of diethyl phthalate decreased from 610,684 pounds in 1978 to 511,475 pounds in 1982 (HSDB 1994). More recent data on imports are not available. There are no data available on U.S. exports of diethyl phthalate.

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4.3 USE

There is a wide variety of consumer products that contain diethyl phthalate or are covered with diethyl phthalate-containing plastic packaging (Kamrin and Mayor 1991). Diethyl phthalate is used as a plasticizer for cellulose ester plastic films and sheets (photographic, blister packaging, and tape applications) and molded and extruded articles (consumer articles such as toothbrushes, automotive components, tool handles, and toys). Diethyl phthalate was reported as an ingredient in 67 cosmetic formulations at concentrations ranging from $\leq 0.1\%$ to 25-50%. These cosmetics included bath preparations (oils, tablets, and salts), eye shadows, toilet waters, perfumes and other fragrance preparations, hair sprays, wave sets, nail polish and enamel removers, nail extenders, nail polish, bath soaps, detergents, aftershave lotions, and skin care preparations (Anonymous 1985; Kamrin and Mayor 1991). More specifically, diethyl phthalate is used in nail polish as a solvent for nitrocellulose and cellulose acetate, in perfumes as a fixative and solvent, in toilet preparations as an alcohol denaturant, and in fingernail elongators as a plasticizer (Anonymous 1985; EPA 1989; Hawley 1987; Verschueren 1983). In addition, diethyl phthalate is used as a component in insecticide sprays and mosquito repellents, as a camphor substitute, as a plasticizer in solid rocket propellants, as a wetting agent, as a dye application agent, as an ingredient in aspirin coatings, as a diluent in polysulfide dental impression materials, and in adhesives, plasticizers, and surface lubricants used in food and pharmaceutical packaging (Anonymous 1985; EPA 1989; Guy and Powers 1977; Hawley 1987; Verschueren 1983).

4.4 DISPOSAL

Recommended methods for disposal of diethyl phthalate include incineration and landfill. The best techniques for incineration are liquid injection and rotary kiln. The incineration range for the former is 650°C to 1,600°C, with a residence time of 0.1 to 2 seconds. The temperature range for rotary kiln incineration is 820°C to 1,600°C. Fluidized bed incineration, with a temperature range of 450°C to 980°C is also a good technique (HSDB 1994). Combustion of diethyl phthalate may be improved by mixing with a more flammable solvent (OHM/TADS 1991). Landfill may be implemented after adsorption on vermiculite or a similar adsorbent. Before implementing land disposal of waste residue, environmental regulatory agencies should be consulted for guidance on acceptable disposable practices (HSDB 1994).