

4. PRODUCTION, IMPORT, USE, AND DISPOSAL

4.1 PRODUCTION

According to the most recent edition of the United States International Trade Commission publication on U.S. production and sales of synthetic organic chemicals (USITC 1987), Union Carbide (Institute, WV), is the only domestic manufacturer of isophorone. A comparison of the list of isophorone manufacturers in USITC (1987) and USITC (1986) shows that Exxon Corporation (Bayway, NJ) also manufactured this chemical, but discontinued production in 1985. Because of the limited number of domestic manufacturers of isophorone and their desire to maintain confidentiality, up-to-date information regarding the production volume of isophorone in the U.S. is not available. In 1973, 35 million pounds of isophorone were produced in the United States (Papa and Sherman 1981) and in 1980, approximately 20-30 million pounds were produced (CMA 1981). The decrease may be because of replacement of isophorone with less costly solvents (CMA 1981).

Isophorone can be prepared by (1) passing acetone vapor over a catalyst bed of magnesium aluminate, zinc oxide-bismuth oxide, or calcium oxide under pressure at 300-400°C or (2) reacting acetone, water (up to 30%), and potassium hydroxide ($\cong 1\%$) in a column under a pressure of about 35 atm and at a temperature of about 200°C (Papa and Sherman 1981). Commercial isophorone usually contains some unconjugated isomer (up to 5%) and small amounts (<1%) of xylitone (Papa and Sherman 1981). Isophorone tends to discolor on prolonged storage; stabilization against color formation can be provided by treatment with p-toluenesulfonic acid, acidified Fuller's earth, diazines, or diisopropylamine (Papa and Sherman 1981).

4.2 IMPORT

During 1984, 2,158 million pounds of isophorone were imported into the United States (HSDB 1988).

4.3 USE

Isophorone is a solvent for a large number of natural and synthetic polymers, resins, waxes, fats, and oils. Specifically, it is used as a solvent for concentrated vinyl chloride/acetate-based coating systems for metal cans, other metal paints, nitrocellulose finishes, printing inks for plastics, some herbicide and pesticide formulations, and adhesives for plastics, poly(vinyl) chloride and polystyrene materials (Papa and Sherman 1981). Isophorone also is an intermediate in the synthesis of 3,5-xyleneol, 3,3,5-trimethylcyclohexanol (Papa and Sherman 1981), and plant growth retardants (Haruta et al. 1974). Of the total production, 45-65% is used in vinyl coatings and inks, 15-25% in agricultural formulations, 15-30% in miscellaneous uses and exports, and 10% as a chemical intermediate (CMA 1981).

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4.4 DISPOSAL

Isophorone may be disposed of by incineration, wastewater treatment, or sanitary landfill (OHM-TADS 1988).

4.5 ADEQUACY OF THE DATABASE

Section 104 (i) (5) of CERCLA, directs the Administrator of ATSDR (in consultation with the Administrator of EPA and agencies and programs of the Public Health Service) to assess whether adequate information on the health effects of isophorone is available. Where adequate information is not available, ATSDR, in cooperation with the National Toxicology Program (NTP), is required to assure the initiation of a program of research designed to determine these health effects (and techniques for developing methods to determine such health effects). The following discussion highlights the availability, or absence, of exposure and toxicity information applicable to human health assessment. A statement of the relevance of identified data needs is also included. In a separate effort, ATSDR, in collaboration with NTP and EPA, will prioritize data needs across chemicals that have been profiled.

4.5.1 Data Needs

Production, Use, Release, and Disposal. Industrial production methods for isophorone are well described in the literature (including the patent literature) and there does not appear to be a need for further information in this area. Uses of isophorone are documented, but a recent detailed breakdown of the percentage of production consumed by each use category is lacking. There is also a lack of data regarding the presence of isophorone in retail products, such as paints and paint thinners. This information, which is useful for estimating the potential for environmental releases from various industries as well as the potential environmental burden, is difficult to obtain in detail since it is considered confidential business information for those industries that manufacture isophorone. Release information is similar to use information in that it is not easily obtained and can be used to estimate environmental burdens and potentially exposed populations. According to the Emergency Planning and Community Right to Know Act of 1986 (EPCRTKA), ((313), (Pub. L. 99-499, title III, (313), industries are required to submit release information to the EPA. The Toxic Release Inventory (TRI), which contains release information for 1987, became available in May of 1989. This database will be updated yearly and should provide a more reliable estimate of industrial production and emission. Disposal information is useful for determining environmental burden and potential sources of high environmental exposures. There is a lack of data on current disposal practices for this chemical.