1-Amino-2,4-dibromoanthraquinone (ADBAQ) is reasonably anticipated to be a human carcinogen based on sufficient evidence from studies in experimental animals.

Carcinogenicity

1-Amino-2,4-dibromoanthraquinone (ADBAQ) is an anthraquinone-derived vat dye that is a reddish-brown to orange powder at room temperature (NTP 1996). It is insoluble in water, making it a colorfast dye. Physical and chemical properties of ADBAQ are listed in the following table.

<table>
<thead>
<tr>
<th>Property</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molecular weight</td>
<td>368 ± 4</td>
</tr>
<tr>
<td>Melting point</td>
<td>221°C</td>
</tr>
<tr>
<td>Log Kow</td>
<td>5.3 ± 0.1</td>
</tr>
<tr>
<td>Water solubility</td>
<td>0.000015 g/L at 25°C</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>1.44 x 10⁻⁷ mm Hg at 25°C</td>
</tr>
</tbody>
</table>


Use

ADBAQ and other aminoanthraquinones are key intermediates in the production of almost all anthraquinone dyes (HSDB 2009). Anthraquinones, including ADBAQ, are widely used as starting material for the manufacture of vat dyes, which are a class of water-insoluble dyes that can easily be reduced to a water-soluble and usually colorless form. In this form, they are readily impregnated into fibers and textiles. Oxidation then produces an insoluble colored form that is remarkably fast to washing, light, and chemicals. Vat dyes typically are used with cotton, wool, and cellulose acetate (NTP 1996).

Production

ADBAQ is prepared from 1-aminoanthraquinone by bromination in dilute mineral acids (HSDB 2009). In 2009, ADBAQ was produced by one manufacturer in China and was available from at least five U.S. suppliers (SRI 2009, ChemSources 2009). In 1991, U.S. production of all vat dyes totaled 14 million kilograms (31 million pounds) (NTP 1996).

Exposure

The primary route of potential exposure to ADBAQ is through dermal contact. Because ADBAQ has a very low vapor pressure, inhalation exposure to vapor is unlikely; however, contaminated dust particles could be inhaled. ADBAQ is not known to be formed naturally in the environment, but may be released into the environment during its production or through its use in the production of anthraquinone dyes. ADBAQ was detected in raw wastewater of a dye manufacturing plant in four of eight samples, at concentrations of 92 to 170 ppb. However, it was not detected in the final effluent before its release into a nearby river or in sediments from the river, which suggests that ADBAQ may have been biodegraded or adsorbed to sludge during wastewater treatment (HSDB 2009). No information was found on occupational exposure specifically to ADBAQ or to anthraquinone dyes in general; however, epidemiological studies indicated occupa-
tional exposure to anthraquinone dyes in a New Jersey dye and resin manufacturing plant (Sathiakumar and Delzell 2000).

**Regulations**

**Environmental Protection Agency (EPA)**

**Emergency Planning and Community Right-To-Know Act**

Toxics Release Inventory: Listed substance subject to reporting requirements.

**References**


