DIISONONYL PHTHALATE (DINP)

Diisononyl phthalate (DINP) is a mixture of isomeric compounds that are branched alkyl di-ester phthalates of 1,2-benzenedicarboxylic acid, in which the alkyl ester moieties contain a total of nine carbons. DINP is used as a plasticizer, especially in the production of polyvinyl chloride (PVC). It is not bound to the PVC plastic, and is released over time into the environment. DINP is used in a broad range of consumer products, including coated fabrics, electrical insulation, vinyl flooring, wood veneer, carpet backing, artificial leather, shoes, sealants, gloves, tubing, garden hoses, pool liners, and tarps. Workers are exposed during the manufacture of DINP and the manufacture and processing of DINP-containing products. The general population is exposed through the use of products containing DINP, and through environmental exposures.

DINP passed the animal data screen, underwent a preliminary toxicological evaluation, and is being brought to the Carcinogen Identification Committee for consultation. This is a compilation of the relevant studies identified during the preliminary toxicological evaluation.

Epidemiological data

No cancer epidemiology studies were identified.

Animal carcinogenicity data

- Long-term diet studies of DINP in rats
  - Two-year studies in male and female Fischer 344 rats: Moore (1998a) / Covance, as described in CPSC (2001, pp. 67-70) and Babich et al. (2004, pp. 156-157)
  - Two-year studies in male and female Fischer 344 rats: Lington et al. (1997), also described in CPSC (2001, pp. 70-71) and Babich et al. (2004, pp. 156-157)

- Long-term diet studies of DINP in mice
  - Two-year studies in male and female B6C3F1 mice: Moore (1998b) / Covance, as described in CPSC (2001, pp. 72-73) and Babich et al. (2004, pp. 156-157)

- Long-term diet studies of Saniticizer 900 (a 99.9% pure mixture of dinonyl phthalates)
  - Two-year studies in male and female Sprague-Dawley CD rats: Bio/dynamics (1986), as described in CPSC (2001, pp. 74-77)
Other relevant data

- Genotoxicity
  - Review: Babitch et al. (2004, p. 154)

- Effects on testosterone synthesis: Borch et al. (2004); Babich et al. (2004, p. 158)

- Structure activity considerations
  - DINP is similar in structure, metabolism, anti-androgen activity in fetal male rats, and tumor induction to the Proposition 65 carcinogen di-(2-ethylhexyl)phthalate (DEHP): CPSC (2001, pp. 77-78)
  - Similar in structure, metabolism, and tumor induction with other phthalates: CPSC (2001, pp. 77-78)

- Mechanisms
  - Testicular dysgenesis syndrome: Borch et al. (2004)
  - Peroxisome proliferator-activated receptor α (PPARα) agonism: Ito et al. (2007), Takashima et al. (2008), Yang et al. (2007), Babich et al. (2004), Kaufmann et al. (2002), Valles et al. (2003)

Reviews

- Fed Reg (2000)
- CPSC (2001)
- Babich et al. (2004)

References


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1 Copies of these listed references, as either the abstract, the relevant sections of the publication, or the complete publication, have been provided to members of the Carcinogen Identification Committee. These references have been provided in the order in which they are discussed in this document.


