

Substance Information Document

d-Limonene

1. Substance identity

Name	d-Limonene
Synonyms	(R)-p-Mentha-1,8-diene
IUPAC Name	(4R)-1-methyl-4-prop-1-en-2-ylcyclohexene
CAS	5989-27-5

2. Toxicological information

d-Limonene were found as non-mutagenic in bacterial reverse mutation test and no genotoxic in a chromosome aberration test in human lymphocytes and in a study on sister chromatid exchange in CHO cells. In two gene mutation tests in mouse lymphoma L5178Y cells, d-limonene did not demonstrate any mutagenic potential. No effects were observed on reproductive organs in the 90-day repeated dose toxicity study conducted in rats and mice. In two carcinogenicity studies in F344/N rats and B6C3F1 mice (2-year study by gavage) on d-Limonene was observed an increased incidences of renal tubular cell hyperplasia, adenomas, and adenocarcinomas of the kidney in male rats. No increased incidences of tumors have been reported in female rats and in mice. The mechanism of nephrocarcinogenicity has been proven as being male-rat specific and not relevant for humans.

d-Limonene is moderate irritating on skin and slight irritating on eyes in rabbits. Inhalation of d-Limonene may cause dizziness, rapid and shallow breathing, tachycardia, bronchial irritation, unconsciousness, and convulsions according to National Toxicology Program. It was also found to be a skin sensitizer in two LLNA studies. No data were identified on respiratory sensitization.

Studies in laboratory animals suggest that d-Limonene is of moderate-low acute oral (LD50 > 2000 mg/kg bw in rats) and dermal toxicity (LD50 ≥ 5000 mg/kg bw in rabbits). No data were identified on acute toxicity for inhalation. Several studies on oral repeated-dose toxicity are available in literature. It was found that d-limonene induces some toxicological effects from 1000 mg/kg bw/d when administrate orally for 6 months. No data were identified on inhalation and dermal repeated-dose toxicity.

JECFA	Safety evaluation of certain food additives. Series 54
FEMA	3. GRAS Substances(2001-3124)_0.pdf (femaflavor.org)
EFSA	Scientific Opinion on Flavouring Group Evaluation 78, Revision 2 (FGE.78Rev2): Consideration of aliphatic and alicyclic and aromatic hydrocarbons evaluated by JECFA (63rd meeting) structurally related to aliphatic hydrocarbons evaluated by EFSA in FGE.25Rev3 (wiley.com)

ECHA – REACH dossier	Registration Dossier - ECHA (europa.eu)
PUBCHEM	D-Limonene C10H16 - PubChem (nih.gov)
CIR	-
OSHA	-

3. Addictiveness and attractiveness

No substance-specific attractiveness data were identified.

SCENIHR	-
EMA	-
PUBMED	-