```
MSDS      : Cyclohexene, 1-methyl-4-(1-methylethenyl)-,
            (R)-
CAS       : 5989-27-5
SYNONYMS  : * Carvene
            * Cyclohexene, 4-isopropenyl-1-methyl-
            * (+)-4-Isopropenyl-1-methylcyclohexene
            * d-Limonene
            * D-(+)-Limonene
            * (+)-R-Limonene
            * d-Limoneno
            * d-p-Mentha-1,8-diene
            * p-Mentha-1,8-diene, (R)-(+)-
            * (R)-1-Methyl-4-(1-
            methylethenyl)cyclohexene
            * NCI-C55572
            * Refchole
```

Catalog of Chemical Suppliers, Buyers, Custom Synthesis Companies And Equipment Manufacturers [Cyclohexene, 1-methyl-4-(1-methylethenyl)-, (R)- 5989-27-5]

Suppliers:

Not Available

Buyers:

Not Available

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                    *** CHEMICAL IDENTIFICATION ***

RTECS NUMBER            : GW6360000
CHEMICAL NAME           : Cyclohexene, 1-methyl-4-(1-methylethenyl)-,
(R)-
CAS REGISTRY NUMBER     : 5989-27-5
OTHER CAS REGISTRY NOS. : 7705-13-7
                          95327-98-3
LAST UPDATED            : 199712
DATA ITEMS CITED        : 35
MOLECULAR FORMULA       : C10-H16
MOLECULAR WEIGHT        : 136.26
WISWESSER LINE NOTATION : L6UTJ A1 DY1&U1 -R
COMPOUND DESCRIPTOR     : Tumorigen
                          Drug
                          Reproductive Effector
SYNONYMS/TRADE NAMES :
   * Carvene
   * Cyclohexene, 4-isopropenyl-1-methyl-
   * (+)-4-Isopropenyl-1-methylcyclohexene
```

* d-Limonene
* D-(+)-Limonene
* (+)-R-Limonene
* d-Limoneno
* d-p-Mentha-1,8-diene
* p-Mentha-1,8-diene, (R)-(+)-
* (R)-1-Methyl-4-(1-methylethenyl)cyclohexene
* NCI-C55572
* Refchole

*** HEALTH HAZARD DATA ***

** ACUTE TOXICITY DATA **

TYPE OF TEST : LD50 - Lethal dose, 50 percent kill
ROUTE OF EXPOSURE : Oral
SPECIES OBSERVED : Rodent - rat
DOSE/DURATION : 4400 mg/kg
TOXIC EFFECTS :
Behavioral - changes in motor activity (specific assay)
Lungs, Thorax, or Respiration - respiratory depression
Skin and Appendages - hair
REFERENCE :
OYYAA2 Oyo Yakuri. Pharmacometrics. (Oyo Yakuri Kenkyukai, CPO Box 180,
Sendai 980-91, Japan) V.1- 1967- Volume(issue)/page/year: 9,387,1975

TYPE OF TEST : LD50 - Lethal dose, 50 percent kill
ROUTE OF EXPOSURE : Intraperitoneal
SPECIES OBSERVED : Rodent - rat
DOSE/DURATION : 3600 mg/kg
TOXIC EFFECTS :
Behavioral - changes in motor activity (specific assay)
Lungs, Thorax, or Respiration - respiratory depression
Skin and Appendages - hair
REFERENCE :
OYYAA2 Oyo Yakuri. Pharmacometrics. (Oyo Yakuri Kenkyukai, CPO Box 180,
Sendai 980-91, Japan) V.1- 1967- Volume(issue)/page/year: 9,387,1975

TYPE OF TEST : LDLo - Lowest published lethal dose
ROUTE OF EXPOSURE : Subcutaneous
SPECIES OBSERVED : Rodent - rat
DOSE/DURATION : 30200 mg/kg
TOXIC EFFECTS :
Behavioral - excitement
Lungs, Thorax, or Respiration - respiratory depression
Skin and Appendages - hair
REFERENCE :
OYYAA2 Oyo Yakuri. Pharmacometrics. (Oyo Yakuri Kenkyukai, CPO Box 180,
Sendai 980-91, Japan) V.1- 1967- Volume(issue)/page/year: 9,387,1975

TYPE OF TEST : LD50 - Lethal dose, 50 percent kill
ROUTE OF EXPOSURE : Intravenous
SPECIES OBSERVED : Rodent - rat
DOSE/DURATION : 110 mg/kg
TOXIC EFFECTS :
Behavioral - convulsions or effect on seizure threshold
Lungs, Thorax, or Respiration - respiratory depression
Skin and Appendages - hair
REFERENCE :
OYYAA2 Oyo Yakuri. Pharmacometrics. (Oyo Yakuri Kenkyukai, CPO Box 180,
Sendai 980-91, Japan) V.1- 1967- Volume(issue)/page/year: 9,387,1975

TYPE OF TEST : LD50 - Lethal dose, 50 percent kill
ROUTE OF EXPOSURE : Oral
SPECIES OBSERVED : Rodent - mouse
DOSE/DURATION : 5600 mg/kg
TOXIC EFFECTS :
Behavioral - changes in motor activity (specific assay)
Lungs, Thorax, or Respiration - respiratory depression
Skin and Appendages - hair
REFERENCE :
OYYAA2 Oyo Yakuri. Pharmacometrics. (Oyo Yakuri Kenkyukai, CPO Box 180,
Sendai 980-91, Japan) V.1- 1967- Volume(issue)/page/year: 9,387,1975

TYPE OF TEST : LD50 - Lethal dose, 50 percent kill
ROUTE OF EXPOSURE : Intraperitoneal
SPECIES OBSERVED : Rodent - mouse
DOSE/DURATION : 600 mg/kg
TOXIC EFFECTS :
Behavioral - altered sleep time (including change in righting reflex)
Behavioral - somnolence (general depressed activity)
Nutritional and Gross Metabolic - body temperature decrease
REFERENCE :
OYYAA2 Oyo Yakuri. Pharmacometrics. (Oyo Yakuri Kenkyukai, CPO Box 180,
Sendai 980-91, Japan) V.1- 1967- Volume(issue)/page/year: 8,1439,1974

TYPE OF TEST : LD50 - Lethal dose, 50 percent kill
ROUTE OF EXPOSURE : Subcutaneous
SPECIES OBSERVED : Rodent - mouse
DOSE/DURATION : 3170 mg/kg
TOXIC EFFECTS :
Peripheral Nerve and Sensation - spastic paralysis with or without sensory
change
REFERENCE :
SIZSAR Sapporo Igaku Zasshi. Sapporo Medical Journal. (Sapporo Igaku
Daigaku, Nishi-17-chome, Minami-1-jo, Chuo-ku, Sapporo 060, Japan) V.3-

1952- Volume(issue)/page/year: 3,73,1952

TYPE OF TEST : LDLo - Lowest published lethal dose
ROUTE OF EXPOSURE : Intraduodenal
SPECIES OBSERVED : Rodent - mouse
DOSE/DURATION : 1 gm/kg
TOXIC EFFECTS :
Behavioral - altered sleep time (including change in righting reflex)
Behavioral - somnolence (general depressed activity)
Nutritional and Gross Metabolic - body temperature decrease
REFERENCE :
OYYAA2 Oyo Yakuri. Pharmacometrics. (Oyo Yakuri Kenkyukai, CPO Box 180,
Sendai 980-91, Japan) V.1- 1967- Volume(issue)/page/year: 8,1439,1974

TYPE OF TEST : LD50 - Lethal dose, 50 percent kill
ROUTE OF EXPOSURE : Administration onto the skin
SPECIES OBSERVED : Rodent - rabbit
DOSE/DURATION : >5 gm/kg
TOXIC EFFECTS :
Details of toxic effects not reported other than lethal dose value
REFERENCE :
FCTXAV Food and Cosmetics Toxicology. (London, UK) V.1-19, 1963-81. For
publisher information, see FCTOD7. Volume(issue)/page/year: 13,825,1975

TYPE OF TEST : LD50 - Lethal dose, 50 percent kill
ROUTE OF EXPOSURE : Administration onto the skin
SPECIES OBSERVED : Mammal - species unspecified
DOSE/DURATION : >5 gm/kg
TOXIC EFFECTS :
Details of toxic effects not reported other than lethal dose value
REFERENCE :
FCTXAV Food and Cosmetics Toxicology. (London, UK) V.1-19, 1963-81. For
publisher information, see FCTOD7. Volume(issue)/page/year: 12,703,1974

** OTHER MULTIPLE DOSE TOXICITY DATA **

TYPE OF TEST : TDLo - Lowest published toxic dose
ROUTE OF EXPOSURE : Oral
SPECIES OBSERVED : Rodent - rat
DOSE/DURATION : 39600 mg/kg/16D-I
TOXIC EFFECTS :
Related to Chronic Data - death
REFERENCE :
NTPTR* National Toxicology Program Technical Report Series. (Research
Triangle Park, NC 27709) No.206- Volume(issue)/page/year: NTP-TR-347,1990

TYPE OF TEST : TDLo - Lowest published toxic dose

ROUTE OF EXPOSURE : Oral
SPECIES OBSERVED : Rodent - rat
DOSE/DURATION : 840 mg/kg/4W-C
TOXIC EFFECTS :
Kidney, Ureter, Bladder - other changes in urine composition
Kidney, Ureter, Bladder - other changes
REFERENCE :
FCTOD7 Food and Chemical Toxicology. (Pergamon Press Inc., Maxwell House,
Fairview Park, Elmsford, NY 10523) V.20- 1982-
Volume(issue)/page/year:
31,125,1993

TYPE OF TEST : TDLo - Lowest published toxic dose
ROUTE OF EXPOSURE : Oral
SPECIES OBSERVED : Rodent - rat
DOSE/DURATION : 4875 mg/kg/91D-I
TOXIC EFFECTS :
Liver - changes in liver weight
Kidney, Ureter, Bladder - other changes
Kidney, Ureter, Bladder - changes in bladder weight
REFERENCE :
FCTOD7 Food and Chemical Toxicology. (Pergamon Press Inc., Maxwell House,
Fairview Park, Elmsford, NY 10523) V.20- 1982-
Volume(issue)/page/year:
27,639,1989

TYPE OF TEST : TDLo - Lowest published toxic dose
ROUTE OF EXPOSURE : Oral
SPECIES OBSERVED : Rodent - rat
DOSE/DURATION : 1500 mg/kg/5D-I
TOXIC EFFECTS :
Liver - changes in liver weight
Kidney, Ureter, Bladder - changes in bladder weight
REFERENCE :
FCTOD7 Food and Chemical Toxicology. (Pergamon Press Inc., Maxwell House,
Fairview Park, Elmsford, NY 10523) V.20- 1982-
Volume(issue)/page/year:
25,345,1987

TYPE OF TEST : TDLo - Lowest published toxic dose
ROUTE OF EXPOSURE : Oral
SPECIES OBSERVED : Rodent - mouse
DOSE/DURATION : 39600 mg/kg/16D-I
TOXIC EFFECTS :
Related to Chronic Data - death
REFERENCE :
NTPTR* National Toxicology Program Technical Report Series. (Research
Triangle Park, NC 27709) No.206- Volume(issue)/page/year: NTP-TR-347,1990

TYPE OF TEST : TDLo - Lowest published toxic dose
ROUTE OF EXPOSURE : Oral

SPECIES OBSERVED : Rodent - mouse
DOSE/DURATION : 32500 mg/kg/13W-I
TOXIC EFFECTS :
Related to Chronic Data - death
REFERENCE :
NTPTR* National Toxicology Program Technical Report Series. (Research
Triangle Park, NC 27709) No.206- Volume(issue)/page/year: NTP-TR-347,1990

TYPE OF TEST : TDLo - Lowest published toxic dose
ROUTE OF EXPOSURE : Oral
SPECIES OBSERVED : Mammal - dog
DOSE/DURATION : 180 gm/kg/26W-I
TOXIC EFFECTS :
Kidney, Ureter, Bladder - changes in bladder weight
REFERENCE :
FCTOD7 Food and Chemical Toxicology. (Pergamon Press Inc., Maxwell House,
Fairview Park, Elmsford, NY 10523) V.20- 1982- Volume(issue)/page/year:
28,669,1990

** TUMORIGENIC DATA **

TYPE OF TEST : TDLo - Lowest published toxic dose
ROUTE OF EXPOSURE : Oral
SPECIES OBSERVED : Rodent - rat
DOSE/DURATION : 38625 mg/kg/2Y-C
TOXIC EFFECTS :
Tumorigenic - Carcinogenic by RTECS criteria
Kidney, Ureter, Bladder - Kidney tumors
Reproductive - Tumorigenic effects - testicular tumors
REFERENCE :
NTPTR* National Toxicology Program Technical Report Series. (Research
Triangle Park, NC 27709) No.206- Volume(issue)/page/year: NTP-TR-347,1990

TYPE OF TEST : TDLo - Lowest published toxic dose
ROUTE OF EXPOSURE : Oral
SPECIES OBSERVED : Rodent - mouse
DOSE/DURATION : 67 gm/kg/39W-I
TOXIC EFFECTS :
Tumorigenic - equivocal tumorigenic agent by RTECS criteria
Gastrointestinal - tumors
REFERENCE :
JNCIAM Journal of the National Cancer Institute. (Washington, DC) V.1-60,
1940-78. For publisher information, see JJIND8. Volume(issue)/page/year:
35,771,1965

** REPRODUCTIVE DATA **

TYPE OF TEST : TDLo - Lowest published toxic dose

ROUTE OF EXPOSURE : Oral
SPECIES OBSERVED : Rodent - rat
DOSE : 20083 mg/kg
SEX/DURATION : female 9-15 day(s) after conception
TOXIC EFFECTS :
Reproductive - Specific Developmental Abnormalities - musculoskeletal system
Reproductive - Effects on Newborn - growth statistics (e.g.%, reduced weight gain)
Reproductive - Effects on Newborn - physical
REFERENCE :
OYYAA2 Oyo Yakuri. Pharmacometrics. (Oyo Yakuri Kenkyukai, CPO Box 180, Sendai 980-91, Japan) V.1- 1967- Volume(issue)/page/year: 10,179,1975

TYPE OF TEST : TDLo - Lowest published toxic dose
ROUTE OF EXPOSURE : Oral
SPECIES OBSERVED : Rodent - mouse
DOSE : 3546 mg/kg
SEX/DURATION : female 7-12 day(s) after conception
TOXIC EFFECTS :
Reproductive - Specific Developmental Abnormalities - musculoskeletal system
Reproductive - Effects on Newborn - physical
REFERENCE :
OYYAA2 Oyo Yakuri. Pharmacometrics. (Oyo Yakuri Kenkyukai, CPO Box 180, Sendai 980-91, Japan) V.1- 1967- Volume(issue)/page/year: 13,863,1977

TYPE OF TEST : TDLo - Lowest published toxic dose
ROUTE OF EXPOSURE : Oral
SPECIES OBSERVED : Rodent - mouse
DOSE : 14178 mg/kg
SEX/DURATION : female 7-12 day(s) after conception
TOXIC EFFECTS :
Reproductive - Effects on Newborn - growth statistics (e.g.%, reduced weight gain)
REFERENCE :
OYYAA2 Oyo Yakuri. Pharmacometrics. (Oyo Yakuri Kenkyukai, CPO Box 180, Sendai 980-91, Japan) V.1- 1967- Volume(issue)/page/year: 13,863,1977

TYPE OF TEST : TDLo - Lowest published toxic dose
ROUTE OF EXPOSURE : Oral
SPECIES OBSERVED : Rodent - rabbit
DOSE : 3250 mg/kg
SEX/DURATION : female 6-18 day(s) after conception
TOXIC EFFECTS :
Reproductive - Effects on Newborn - physical
REFERENCE :
OYYAA2 Oyo Yakuri. Pharmacometrics. (Oyo Yakuri Kenkyukai, CPO Box

180,
Sendai 980-91, Japan) V.1- 1967- Volume(issue)/page/year: 13,885,1977

*** REVIEWS ***

IARC Cancer Review:Animal Limited Evidence
IMEMDT IARC Monographs on the Evaluation of Carcinogenic Risk of Chemicals
to Man. (WHO Publications Centre USA, 49 Sheridan Ave., Albany, NY 12210)
V.1- 1972- Volume(issue)/page/year: 56,135,1993

IARC Cancer Review:Human No Available Data
IMEMDT IARC Monographs on the Evaluation of Carcinogenic Risk of Chemicals
to Man. (WHO Publications Centre USA, 49 Sheridan Ave., Albany, NY 12210)
V.1- 1972- Volume(issue)/page/year: 56,135,1993

IARC Cancer Review:Group 3
IMEMDT IARC Monographs on the Evaluation of Carcinogenic Risk of Chemicals
to Man. (WHO Publications Centre USA, 49 Sheridan Ave., Albany, NY 12210)
V.1- 1972- Volume(issue)/page/year: 56,135,1993

TOXICOLOGY REVIEW
CTRRDO Cancer Treatment Reports. (Washington, DC) V.60-71, 1976-87. For
publisher information, see JNCIEQ. Volume(issue)/page/year: 60,1171,1976

*** NIOSH STANDARDS DEVELOPMENT AND SURVEILLANCE DATA ***

NIOSH OCCUPATIONAL EXPOSURE SURVEY DATA :
NOES - National Occupational Exposure Survey (1983)
NOES Hazard Code - X9088
No. of Facilities: 8310 (estimated)
No. of Industries: 87
No. of Occupations: 65
No. of Employees: 138309 (estimated)
No. of Female Employees: 35634 (estimated)

*** STATUS IN U.S. ***

EPA TSCA Section 8(b) CHEMICAL INVENTORY

EPA TSCA Section 8(d) unpublished health/safety studies

On EPA IRIS database

EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, JUNE 1998

NIOSH Analytical Method, 1996: Volatile organic compound, 2549

NTP Carcinogenesis Studies (gavage);clear evidence:rat
NTPTR* National Toxicology Program Technical Report Series. (Research
Triangle Park, NC 27709) No.206- Volume(issue)/page/year: NTP-TR-347,90

NTP Carcinogenesis Studies (gavage);no evidence:mouse
NTPTR* National Toxicology Program Technical Report Series. (Research
Triangle Park, NC 27709) No.206- Volume(issue)/page/year: NTP-TR-347,90

*** END OF RECORD ***