HAZARDOUS SUBSTANCE ECOLOGICAL FACT SHEET

U.S. Environmental Protection Agency
Office of Toxic Substances

Chemical Name: Cumene
CAS Number: 98-82-8

GENERAL INFORMATION

Cumene (1-methylethylbenzene, 2-phenylpropane, isopropylbenzene) is a liquid petrochemical produced primarily from benzene. Its major use is in the production of phenol, acetone, and a-methylstyrene, all of which are components in plastic resins. A minor use is as a component in aviation gasoline to improve the octane rating. Cumene is moderately soluble in water, and may enter the aquatic environment via effluents from chemical plants where it is manufactured or used, and from spills.

ACUTE (SHORT-TERM) ECOLOGICAL EFFECTS

Acute or short-term ecological effects are severe effects upon aquatic animals or plants, such as death or complete immobilization, which occur following exposure to a chemical in water for a relatively short period of time, such as four days or less. Cumene is considered to have moderate acute toxicity to aquatic life.

CHRONIC (LONG-TERM) ECOLOGICAL EFFECTS

Chronic or long-term ecological effects are generally subtle effects upon aquatic animals or plants, such as reductions in long-term survival, growth, or reproduction; or changes in appearance or behavior following exposure to a chemical in water for a sufficient period of time to include either a complete life-cycle or a significant portion of a life-cycle. Cumene is considered to have moderate chronic toxicity to aquatic life.

DISTRIBUTION AND PERSISTENCE IN THE ENVIRONMENT

The chemical properties of cumene indicate that, after a sufficient amount of time, it will tend to be distributed in the environment as follows:

air	99.65%
soil	0.08%
water	0.19%
suspended solids	< 0.01%
aquatic biota	< 0.01%
sediment	0.07%

Due to volatilization, most cumene will disappear from most aquatic ecosystems in less than two days.

BIOACCUMULATION IN AQUATIC ORGANISMS

The concentration of cumene in edible tissues of most aquatic species that are consumed by humans is expected to be somewhat higher than the average concentration that was present in the water in which the organisms had been living.

ECOTOXICITY PROFILE

21-JUL-88

U.S. Environmental Protection Agency
Environmental Research Laboratory-Duluth

I. Chemical Identification

Name Benzene, (1-methylethyl)-

CAS number 98-82-8
Formula C9 H12

II. Chemical and Physical Properties from QSAR

(All temperature sensitive values assume 25 C)

Molecular Weight (g/mole)	= 120.2
Melting Point (C)	= -96.0
Boiling Point (C)	= 152.
Vapor Pressure (mm of Hg)	= 4.66
Ht Vaporization (cal/mole)	= 8.84E+03
Solubility in Water (mg/L)	= 50.1
Log P	= 3.72
pKa	= not available for this chemical

III. Information from QSAR concerning Exposure and Fate

Bioconcentration Factor	= 345.	
Log(BCF)	= 2.54	See Veith and Kosian 1983
Absorption Coef. Log(Koc)	= 3.36	See Lyman et al. 1982
Hydrolysis Half-Life	> 1000 days	

Hydrolysis is not likely to be an important
transformation mechanism for this chemical

Henry's Constant	= 1.47E-02	atm-m**3/mole
Log10 (Henry's Constant)	= -1.83	atm-m**3/mole

Lyman et al. 1982. would conclude that a chemical with these properties will vaporize rapidly from and will not persist in open water (p15-15).

Mackay Level 1 Environmental Partitioning @25 C Fugacity = 4.117E-05 Pa

99.65 % into air
0.08 % into soil
0.19 % into water
0.00 % into suspended solids
0.00 % into aquatic biota
0.07 % into sediment

Biodegradation Half-life Analysis

***** QSAR OPENED SUBFILE 2 FOR AROMATIC CHEMICALS *****
EVALUATIONS OF DEGRADATION WITHIN THIS SUBFILE WERE BASED ON 86 OR ABOUT 32 % OF THE CHEMICALS IN THE DATA BASE.

THIS CHEMICAL HAS AN AROMATIC RING WITH AT LEAST ONE ISO-PROPYL OR DI-METHYL AMINE TERMINAL BRANCH AND NO OTHER DEGRADABLE BRANCHES. THE RANGE OF HALF-LIFE VALUES FOR ALL 7 CHEMICALS IN THE DEGRADATION DATA BASE WITH A SIMILAR CONFIGURATION IS 25 TO > 100 DAYS. MORE SUBSTITUTIONS ON THE AROMATIC RING BY METHYL AND NITRO GROUPS HAVE BEEN SHOWN TO IMPEDE DEGRADATION [E.G., SEE WEBLEY ET.AL. (1959), KRAMER AND DOETSCH (1950), ALEXANDER (1965), DIAZ AND ALEXANDER (1971)].

IV. Toxicological Information from QSAR

Toxicity to the fathead minnow

LC50 (mg/L)	= 2.16
MATC (mg/L)	= 0.165

Phytotoxicity Assessment

The rules for distinguishing substructures which may have inhibitory effects on plant growth and development are being formulated by Dr. Fumihiko Hayashi of the Office of Toxic Substances, Washington, D.C.
HERD/EEB Room E431 Phone (202)382-4278.

This chemical does not contain structural features which the QSAR SYSTEM now regards as highly toxic to algae or aquatic plants.

Genetic/Mutagenic Assessment

There is no information in the QSAR SYSTEM which would suggest that this chemical is a potential carcinogen or mutagen.

21-JUL-88

V. AQUIRE SUMMARY

Name Benzene, (1-methylethyl)-

CAS number 98-82-8

SPECIES	EFFECT	DURATION (DAYS)	E T	LIFE STAGE	CONC. (ug/l)	M U	REF NO.
AGMENELLUM QUADRUPLICATUM BLUE-GREEN ALGAE	PGR	5.00 8.00	V	5-10000 CELLS/ML	2000 UG	U	940
ARTEMIA SALINA BRINE SHRIMP	LC50	1.00	S	NAUPLII	110000	U	2408
ARTEMIA SALINA BRINE SHRIMP	LC50	1.00	S	NAUPLII	114 MM/M3	U	11926
CHLAMYDOMONAS ANGULOSA GREEN ALGAE	EC50PS	0.13	S	3-4 D, EXPO PHASE, 5E+4 CELLS/ML	21300	U	5065
CHLORELLA AUTOTROPHICA GREEN ALGAE	PGR	5.00 8.00	V	5-10000 CELLS/ML	1000 UG	U	940
CHLORELLA AUTOTROPHICA GREEN ALGAE	PGR	5.00 8.00	V	5-10000 CELLS/ML	2000 UG	U	940
CHLORELLA VULGARIS GREEN ALGAE	EC50PS	0.13	S	3-4 D, EXPO PHASE, 20E+4 CELLS/ML	8770	U	5065
CRASSOSTREA GIGAS PACIFIC OYSTER	EC50DV	2.00	S	EGGS	203000	U	8621
CRASSOSTREA GIGAS PACIFIC OYSTER	LC50	2.00	S	EGGS	159000	U	8621
DAPHNIA MAGNA WATER FLEA	EC50IM	2.00	S	4-6 D, 1.5 MM	5 MM/M3	U	11936
DAPHNIA MAGNA WATER FLEA	LC50	1.00	S	24 H	95000	U	5718
LEUCISCUS IDUS IDE, SILVER OR GOLDEN ORFE	LC50		S	NR	47000	U	547
LEUCISCUS IDUS IDE, SILVER OR GOLDEN ORFE	LC50		S	NR	207000	U	547

REFERENCES:

REF. NUMBER: 547
AUTHOR(S): JUHNKE,I. AND D.LUEDEMANN
YEAR: 1978
TITLE: RESULTS OF THE INVESTIGATION OF 200 CHEMICAL COMPOUNDS FOR ACUTE FISH TOXICITY WITH THE GOLDEN ORFE TEST
SOURCE: Z.F. WASSER-UND ABWASSER-FORSCHUNG 11(5):161-164
(COMPLETE GERMAN, AND ENGLISH TRANSLATION AVAIL)

REF. NUMBER: 940
AUTHOR(S): PULICH,W.M.JR., K.WINTERS, AND C.VANBAALEN
YEAR: 1974
TITLE: THE EFFECTS OF A NO. 2 FUEL OIL AND TWO CRUDE OILS ON THE GROWTH AND PHOTOSYNTHESIS OF MICROALGAE
SOURCE: MAR. BIOL. 28(2):87-94

REF. NUMBER: 2408
AUTHOR(S): PRICE,K.S., G.T.WAGGY, AND R.A.CONWAY
YEAR: 1974
TITLE: BRINE SHRIMP BIOASSAY AND SEAWATER BOD OF PETROCHEMICALS
SOURCE: J. WATER POLLUT. CONTROL FED. 46(1):63-77

REF. NUMBER: 5065
AUTHOR(S): HUTCHINSON,T.C., J.A.HELLEBUST, D.TAM, D.MACKAY, R.A. MASCARENHAS, AND W.Y.SHIU
YEAR: 1980
TITLE: THE CORRELATION OF THE TOXICITY TO ALGAE OF HYDROCARBONS AND HALOGENATED HYDROCARBONS WITH THEIR PHYSICAL-CHEMICAL PROPERTIES
SOURCE: ENVIRON. SCI. RES. 16:577-586

REF. NUMBER: 5718
AUTHOR(S): BRINGMANN,G. AND R.KUHN
YEAR: 1977
TITLE: BEFUNDE DER SCHADWIRKUNG WASSERGEFAHRDENDER STOFFE GEGEN DAPHNIA MAGNA. (THE TOXICITY OF WATERBORNE CONTAMINANTS TOWARDS DAPHNIA MAGNA)
SOURCE: Z. WASSER ABWASSER FORSCH. 10(5):161-166 (IN GERMAN WITH ENGLISH SUMMARY)

REF. NUMBER: 8621
AUTHOR(S): LEGORE,R.S.
YEAR: 1974
TITLE: THE EFFECT OF ALASKAN CRUDE OIL AND SELECTED HYDROCARBON COMPOUNDS ON EMBRYONIC DEVELOPMENT OF THE PACFIC OYSTER, CRASSOSTREA GIGAS
SOURCE: PH. D. THESIS, UNIVERSITY OF WASHINGTON, SEATTLE, WA:189 P.; DISS. ABSTR. INT. 35(7):3168 B (1975)

REF. NUMBER: 11926
AUTHOR(S): ABERNETHY,S., A.M.BOBRA, W.Y.SHIU, P.G.WELLS, AND D.MACKAY
YEAR: 1986
TITLE: ACUTE LETHAL TOXICITY OF HYDROCARBONS AND CHLORINATED HYDROCARBONS TO TWO PLANKTONIC CRUSTACEANS: THE KEY ROLE OF ORGANISM-WATER ...
SOURCE: AQUAT. TOXICOL. 8(3):163-174 (PUBL IN PART AS

REF 11936)

REF. NUMBER: 11936
AUTHOR(S): BOBRA,A.M., W.Y.SHIU, AND D.MACKAY
YEAR: 1983
TITLE: A PREDICTIVE CORRELATION FOR THE ACUTE TOXICITY OF HYDROCARBONS AND CHLORINATED HYDROCARBONS TO THE WATER FLEA (DAPHNIA MAGNA)
SOURCE: CHEMOSPHERE 12(9-10):1121-1129