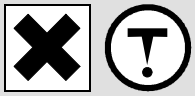
TCI AMERICA

Material Safety Data Sheet

HAZARD WARNINGS	RISK PHRASES	PROTECTIVE CLOTHING
	**Combustible material; avoid heat and sources of ignition.** **Irritating to skin, eyes, and the respiratory system.** **This compound is a skin sensitizer.** **CARCINOGEN. MINIMIZE EXPOSURE.**	

Section I. Chemical Product and Company Identification

Chemical Name **(+)-Limonene**

Catalog Number	L0047
Synonym	(+)-4-Isopropenyl-1-methylcyclohexene
Chemical Formula	$CH_3C(:CH_2)C_6H_8CH_3$
CAS Number	5989-27-5

Supplier: TCI America
9211 N. Harborgate St.
Portland OR
1-800-423-8616

In case of Emergency Call: **Chemtrec®**
(800) 424-9300 (U.S.)
(703) 527-3887 (International)

Section II. Composition and Information on Ingredients

Chemical Name	CAS Number	Percent (%)	TLV/PEL	Toxicology Data
(+)-Limonene	5989-27-5	Min. 95.0 (GC)	This chemical is classified as a carcinogen. There is no acceptable exposure limit for a carcinogen.	Rat LD_{50} (oral) 4400mg/kg Rabbit LD_{50} (dermal) >5000mg/kg Rat LD_{50} (intravenous) 110mg/kg

Section III. Hazards Identification

Acute Health Effects

Irritating to eyes and skin on contact. Inhalation causes irritation of the lungs and respiratory system. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.
Skin contact may result in sensitization. Always cover all exposed skin with an impermeable layer and use proper eye protection. A OSHA/MSHA approved dust and vapor respirator is required when working with this material.
Follow safe industrial hygiene practices and always wear proper protective equipment when handling this compound.

Chronic Health Effects

CARCINOGENIC EFFECTS : Not available.
MUTAGENIC EFFECTS : Not available.
TERATOGENIC EFFECTS : Tumorigenic Effects:
Rat TDLo (oral) 38625 mg/kg/2 years, continuous.
Toxic Effects:
Tumorigenic - Carcinogenic by RTECS criteria.
Kidney, Ureter, and Bladder - Kidney tumors.
Tumorigenic Effects - Testicular tumors.
Mouse TDLo (oral) 67 gm/kg/39 weeks, intermittent.
Toxic Effects:
Tumorigenic - Equivocal tumorigenic agent by RTECS criteria.
Gastrointestinal - Tumors.
DEVELOPMENTAL TOXICITY: Reproductive Effects:
Rat TDLo (oral) 20083 mg/kg, female 9-15 days of pregnancy.
Toxic Effects:
Specific Developmental Abnormalities - Musculoskeletal system.
Effects on Newborn - Growth statistics.
Effects on Newborn - Physical.
Mouse TDLo (oral) 3546 mg/kg, female 7-12 days of pregnancy.
Toxic Effects:
Specific Developmental Abnormalities - Musculoskeletal system.
effects on Newborn - Physical.
Rabbit TDLo (oral)3250 mg/kg, female 6-18 days of pregnancy.
Toxic Effects:
Effects on Newborn - Physical.
Repeated or prolonged exposure to this compound is not known to aggravate existing medical conditions.

Section IV. First Aid Measures

Eye Contact

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin Contact

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Inhalation

If the victim is not breathing, perform mouth-to-mouth resuscitation. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, oxygen can be administered. Seek medical attention if respiration problems do not improve.

Continued on Next Page

Ingestion	INDUCE VOMITING by sticking finger in throat. Lower the head so that the vomit will not reenter the mouth and throat. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. SEEK IMMEDIATE MEDICAL ATTENTION in case of ingestion of a radioactive material.

Section V. Fire and Explosion Data

Flammability	Combustible.	Auto-Ignition	Not available.
Flash Points	43°C (109.4°F).	Flammable Limits	LOWER: 0.7% UPPER: 6.1%
Combustion Products	These products are toxic carbon oxides (CO, CO_2).		
Fire Hazards	Not available.		
Explosion Hazards	Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.		
Fire Fighting Media and Instructions	Combustible liquid. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion. Consult with local fire authorities before attempting large scale fire-fighting operations.		

Section VI. Accidental Release Measures

Spill Cleanup Instructions	Combustible material. Irritating material. Sensitizing material. Carcinogenic material. Keep away from heat. Mechanical exhaust required. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. DO NOT touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Consult federal, state, and/or local authorities for assistance on disposal.

Section VII. Handling and Storage

Handling and Storage Information	COMBUSTIBLE. IRRITANT. SENSITIZER. CARCINOGEN. Keep locked up.. Keep away from heat. Mechanical exhaust required. Avoid excessive heat and light. DO NOT ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. If ingested, seek medical advice immediately and show the container or the label. Treat symptomatically and supportively. Always store away from incompatible compounds such as oxidizing agents.

Section VIII. Exposure Controls/Personal Protection

Engineering Controls	Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash station and safety shower is proximal to the work-station location.
Personal Protection	Splash goggles. Lab coat. Vapor respirator. Vapor respirator. Boots. Gloves. A MSHA/NIOSH approved respirator must be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product. 
Exposure Limits	This chemical is classified as a carcinogen. There is no acceptable exposure limit for a carcinogen.

Section IX. Physical and Chemical Properties

Physical state @ 20°C	Liquid.	Solubility	Soluble in alcohol, ether.
Specific Gravity	0.843 (water=1)		
Molecular Weight	136.23	Partition Coefficient	Not available.
Boiling Point	176 to 177°C (348.8 to 350.6°F)	Vapor Pressure	<0.4 kPa (@ 14.4°C)
Melting Point	-74.35°C (-101.8°F)	Vapor Density	4.7 (Air = 1)
Refractive Index	1.4743 @ 21°C	Volatility	Not available.
Critical Temperature	Not available.	Odor	Fresh, citrus.
Viscosity	Not available.	Taste	Fresh, citrus.

Section X. Stability and Reactivity Data

Stability	This material is stable if stored under proper conditions. (See Section VII for instructions)
Conditions of Instability	Avoid excessive heat and light.
Incompatibilities	Reactive with strong oxidizing agents.

Continued on Next Page Emergency phone number (800) 424-9300

Section XI. Toxicological Information

RTECS Number	GW6360000
Routes of Exposure	Eye Contact. Ingestion. inhalation. Skin contact.
Toxicity Data	Rat LD_{50} (oral) 4400mg/kg Rabbit LD_{50} (dermal) >5000mg/kg Rat LD_{50} (intravenous) 110mg/kg
Chronic Toxic Effects	**CARCINOGENIC EFFECTS** : Not available. **MUTAGENIC EFFECTS** : Not available. **TERATOGENIC EFFECTS** : Tumorigenic Effects: Rat TDLo (oral) 38625 mg/kg/2 years, continuous. Toxic Effects: Tumorigenic - Carcinogenic by RTECS criteria. Kidney, Ureter, and Bladder - Kidney tumors. Tumorigenic Effects - Testicular tumors. Mouse TDLo (oral) 67 gm/kg/39 weeks, intermittent. Toxic Effects: Tumorigenic - Equivocal tumorigenic agent by RTECS criteria. Gastrointestinal - Tumors. **DEVELOPMENTAL TOXICITY**: Reproductive Effects: Rat TDLo (oral) 20083 mg/kg, female 9-15 days of pregnancy. Toxic Effects: Specific Developmental Abnormalities - Musculoskeletal system. Effects on Newborn - Growth statistics. Effects on Newborn - Physical. Mouse TDLo (oral) 3546 mg/kg, female 7-12 days of pregnancy. Toxic Effects: Specific Developmental Abnormalities - Musculoskeletal system. effects on Newborn - Physical. Rabbit TDLo (oral)3250 mg/kg, female 6-18 days of pregnancy. Toxic Effects: Effects on Newborn - Physical. Repeated or prolonged exposure to this compound is not known to aggravate existing medical conditions.
Acute Toxic Effects	Irritating to eyes and skin on contact. Inhalation causes irritation of the lungs and respiratory system. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering. Skin contact may result in sensitization. Always cover all exposed skin with an impermeable layer and use proper eye protection. A OSHA/MSHA approved dust and vapor respirator is required when working with this material. Follow safe industrial hygiene practices and always wear proper protective equipment when handling this compound.

Section XII. Ecological Information

Ecotoxicity	Not available.
Environmental Fate	(D)-Limonene is both a naturally occurring and a synthetically produced terpene which is used in flavors and fragrances, as a solvent and for numerous other commercial uses. If released to soil, (D)-limonene is expected to exhibit low to slight mobility. It is expected to rapidly volatilize from both dry and moist soil to the atmosphere although strong adsorption to soil may attenuate the rate of this process. If released to water, (D)-limonene may bioconcentrate in fish and aquatic organisms and it may significantly adsorb to sediment and suspended organic matter. It is expected to rapidly volatilize from water to the atmosphere. The estimated half-life for volatilization of (D)-limonene from a model river is 3.4 hr, although adsorption to sediment and suspended organic matter may attenuate the rate of this process. If released to the atmosphere, (D)-limonene is expected to rapidly undergo gas-phase oxidation reactions with photochemically produced hydroxyl radicals, ozone, and at night with nitrate radicals. Calculated half-lives for these processes are 2.3-2.6 hr, 25-26 min and 3.1 min, respectively. Occupational exposure to (D)-limonene may occur by inhalation or dermal contact during its production formulation, transport or use. Exposure to the general population may occur by inhalation due to its presence in the atmosphere as a result of released from natural sources or by ingestion of food in which it is contained.

Section XIII. Disposal Considerations

Waste Disposal	Recycle to process, if possible. Consult your local regional authorities. You may be able to dissove or mix material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber system. Observe all federal, state and locl regulations when disposing of the substance.

Section XIV. Transport Information

DOT Classification	CLASS 3: Flammable liquid.
PIN Number	UN2319
Proper Shipping Name	Terpene hydrocarbons, n.o.s.
Packing Group (PG)	III
DOT Pictograms	

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Section XV. Other Regulatory Information and Pictograms

TSCA Chemical Inventory (EPA)	This compound is **ON** the EPA Toxic Substances Control Act (TSCA) inventory list.
WHMIS Classification (Canada)	CLASS B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F).
EINECS Number (EEC)	227-813-5
EEC Risk Statements	R36/37/38- Irritating to eyes, respiratory system and skin. R43- May cause sensitization by skin contact. R45- May cause cancer. R46- May cause heritable genetic damage. R47- May cause birth defects.
Japanese Regulatory Data	Not available.

Section XVI. Other Information

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