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Material Safety Data Sheet
Dicyclopentadiene

Section 1 - Product Identification

Synonym	:	DCPD; Cyclopentadiene dimer; Bicyclopentadiene.
Chemical Formula	:	$C_{10}H_{12}$
Company Identification	:	Tradeasia International Pte. Limited
Address	:	133 Cecil Street # 12-03 Keck Seng Tower, Singapore Tel: +65-6227 6365 Fax: +65-6225 6286 Email: contact@chemtradeasia.com
Recommended use	:	Petrochemical synthesis, organometallic chemistry.

Section 2 – Hazards Identification

2.1. Classification

Hazard list

Flammable liquids - Category 3
Acute toxicity (Oral) - Category 4
Acute toxicity (Inhalation - vapor) - Category 3
Skin Corrosion/Irritation - Category 2
Serious Eye Damage/Eye Irritation - Category 2A
Specific Target Organ Toxicity -Single Exposure - Category 3
Aspiration Hazard - Category 1
Acute hazards to the aquatic environment - Category 2
Chronic hazards to the aquatic environment - Category 2

2.2. Label elements

Symbols/Pictograms

Signal Word

Danger

Hazard Statements

Flammable liquid and vapor.
Toxic if inhaled.
Harmful if swallowed.
Causes skin irritation.
Causes serious eye irritation.
May cause respiratory irritation.
May be fatal if swallowed and enters airways.
Toxic to aquatic life with long lasting effects.

Precautionary Statements

Prevention

Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Keep the container tightly closed. Ground and bond containers and receiving equipment. Use explosion-proof [electrical/ventilating/lighting] equipment. Use non-sparking tools. Take action to prevent static discharges. These alone may be insufficient to remove static electricity. Avoid breathing vapors. Wash hands thoroughly after handling. Do not eat, drink or smoke when using this product. Use only outdoors or in a well-ventilated area. Avoid release to the environment. Wear protective gloves/protective clothing/eye protection/face protection.

Response

IF SWALLOWED: Immediately call a POISON CENTER/doctor. Rinse mouth. Do NOT induce vomiting. IF ON SKIN (or hair): Take off immediately all contaminated clothing and wash it before reuse. Rinse skin with water [or shower]. If skin irritation occurs: Get medical advice/attention. IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. In case of fire: Use dry chemical, foam, carbon dioxide (CO2), water spray or fog to extinguish. Collect spillage.

Storage

Store in a well-ventilated place. Keep cool. Keep the container tightly closed. Store locked up.

Disposal

Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

2.3. Other hazards

Static accumulating flammable liquid can become electrostatically charged even in bonded and grounded equipment. Sparks may ignite liquid and vapor. May cause flash fire or explosion.

Section 3 – Composition/Information on Ingredients

3.1 Composition comments

Chemical Name	EC No/CAS No	Purity, %
Dicyclopentadiene	77-73-6	min. 83

Section 4 – First-Aid Measures

4.1. Description of first aid measures

Eyes

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.

Skin

IF ON SKIN (or hair): Take off immediately all contaminated clothing and wash it before reuse. Rinse skin with water [or shower]. If skin irritation occurs: Get medical advice/attention.

Ingestion

IF SWALLOWED: Immediately call a POISON CENTER/doctor. Rinse mouth. Do NOT induce vomiting.

Inhalation

IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor.

4.2. Most important symptoms and effects, both acute and delayed

Skin irritation. Eye irritation. Respiratory irritation. Vomiting, nausea, abdominal pain and central nervous system effects including headache.

4.3. Indication of any immediate medical attention and special treatment needed

Ensure thorough eye and skin decontamination. Treat unconsciousness, nausea, hypotension, seizures and cardiac arrhythmias in the conventional manner. Aspiration of this product during induced emesis can result in lung injury. If evacuation of stomach contents is considered necessary, use the method least likely to cause aspiration, such as gastric lavage after protecting the airway. Observe hospitalized patients for delayed chemical pneumonia, acute tubular necrosis, encephalopathy and dysrhythmias. Monitor for urinary phenol within 72 hours of acute exposure.

Section 5 – Fire Fighting Measures

5.1. Suitable Extinguishing media

Use dry chemical, foam, carbon dioxide (CO2), water spray or fog to extinguish. Use water to cool fire-exposed containers and to protect personnel.

5.2. Unsuitable Extinguishing media

Do not use straight/direct streams as this may actually spread flames.

5.3. Specific hazards arising from the chemical

Upon combustion, this product emits carbon monoxide, carbon dioxide, low molecular weight hydrocarbons.

5.4. Special protective actions for fire-fighters

Keep upwind. Keep unauthorized personnel away. Move containers from fire area if you can do so without risk. Fight fire from maximum distance or use unmanned holders or monitor nozzles. Immediately withdraw in case of fire and container venting or heat discoloration of a container. Avoid inhaling any smoke and combustion materials. Remove and isolate contaminated clothing and shoes. Cool containers with flooding quantities of water until well after the fire is out. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply.
Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA.

Section 6 – Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Isolate area. Keep unauthorized personnel away. Alert stand-by emergency and fire fighting personnel. Monitor surrounding area for buildup of flammable concentrations in air.

6.2. Methods and material for containment and cleaning up

Wear appropriate personal protective equipment. Do not touch or walk through spilled material. In case of leakage, eliminate all ignition sources. As an immediate precautionary measure, isolate the spill or leak area for at least 50 meters (164 feet) in all directions. Keep upwind. Keep out of low areas. Stop leak if safe to do so. Contain discharge by booming on water or diking on ground. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply.
Small Spills: Remove liquid material with non-sparking approved pumps, skimmers or vacuum equipment. Absorb with earth, sand or other noncombustible material and transfer to containers for later disposal. Use non sparking tools.

Large Spills: Consider downwind evacuation for 300 meters (1000 feet). The main issue with a DCPD spill is odor. Spills on water will volatilize rapidly, making containment or recovery difficult. A vapor-suppressing foam may be used to reduce vapors. Remove pooled liquid material with approved, non-sparking pumps, skimmers or vacuum equipment. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. Soil remediation may be required.

Section 7 – Handling and Storage

7.1. Precautions for safe Handling

Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Keep the container tightly closed. Ground and bond container and receiving equipment. Use explosion-proof [electrical/ventilating/lighting] equipment. Use non-sparking tools. Take action to prevent static discharges. These alone may be insufficient to remove static electricity. Take special precautions when cold cutting or breaking into lines, or when cleaning and disposing of empty containers. Parts and equipment should be steam cleaned prior to maintenance procedures. Do not breathe dust/fume/gas/mist/vapors/spray. Avoid contact with skin and eyes. Keep away from incompatible materials such as oxidizing agents and acids. Wash hands thoroughly after handling. Do not eat, drink or smoke when using this product. Use only outdoors or in a well-ventilated area. Avoid release to the environment. Wear protective gloves/protective clothing/eye protection/face protection. In case of inadequate ventilation, use respiratory protection.

7.2. Conditions for safe storage, including any incompatibilities

Storage area should be clearly identified, well-illuminated and clear of obstruction. Store in a well-ventilated place. Keep the container tightly closed. Store locked up. Only allow access to authorized persons. Store and handle in the properly designed pressure vessels and equipment. Store and use away from heat, sparks, open flame, or any other ignition source. Use non-sparking ventilation systems, approved explosion-proof equipment, and intrinsically safe electrical systems. Have appropriate extinguishing capability in storage area (e.g. sprinkler system, portable fire extinguishers) and flammable gas detectors. Keep absorbents for leaks and spills readily available. Consider the use of internal floating roof tanks or flame arrestors. Inspect vents during winter conditions for vapor ice buildup. Storage tanks should be above ground and diked to hold entire contents. Store away from incompatible materials. Store according to applicable regulations and standards for flammable materials.

Section 8 – Exposure Controls/Personal Protection

8.1. Appropriate engineering controls

Engineering methods to reduce hazardous exposure are preferred controls. Methods include mechanical ventilation (dilution and local exhaust) process or personal enclosure, remote and automated operation, control of process conditions, leak detection and repair systems, and other process modifications. Ensure all exhaust ventilation systems are discharged outdoors, away from air intakes and ignition sources. Supply sufficient replacement air to make up for air removed by exhaust systems. Administrative (procedure) controls and use of personal protective equipment may also be required.

8.2. Individual protection measures, such as personal protective equipment (PPE)

Eye/face protection

Safety glasses. Chemical goggles are recommended if splashing is possible or to prevent eye irritation from vapors.

Skin protection

Chemically resistant gloves.

Body Protection
Wear appropriate clothing to prevent any possibility of skin contact. Wear work clothes with long sleeves and pants. If splashing or contact with liquid material is possible, consider the need for an impervious overcoat. Fire resistant or natural fiber clothing (i.e., cotton or wool) is recommended. Synthetic clothing can generate static electricity and is not recommended. Wear chemical-resistant safety footwear with good traction to prevent slipping.

Respiratory protection
Appropriate NIOSH approved air-purifying respirator or self-contained breathing apparatus should be used. Air supplied breathing apparatus must be used when oxygen concentrations are low or if airborne concentrations exceed the limits of the air-purifying respirators.

Hygiene measures
Use effective control measures and PPE to maintain worker exposure to concentrations that are below these limits. Ensure that eyewash stations and safety showers are in close proximity to work locations.

Section 9 – Physical and Chemical Properties

9.1. Information on basic physical and chemical properties

Physical State: Liquid
Appearance: Clear
Odour: Pungent
Odour Threshold: 0.11 ppm (detectable), (DCPD)
pH: Not applicable
Vapor Pressure: 81 - 87 mm HG (37.8 °C (100.0 °F)) 1.52 psi (37.8 °C(100.0 °F))
Vapor Density: 4.5 (0 °C (32 °F)) (Air=1)
Evaporation Rate: Not available
Viscosity: 2.0 - 2.5 mm^2/s (40 °C (104 °F))
Boiling Range: 150 - 190 °C (302 - 374 °F)
Flash Point: 40 - 50 °C (104 - 122 °F) (Open Cup)
Freezing/Melting Point: -24 °C (-11 °F)
Decomposition Temperature: > 150 °C (> 302 °F)(DCPD)
Solubility: Water insoluble.
Partition coefficient (n-octanol/water): 2.78
Auto-ignition temperature: 503 °C (937 °F)
Density: 970 - 980 kg/m^3
Relative Density: 0.97 - 0.98 (15 °C (59 °F)) (Water=1)

Section 10 – Stability and Reactivity

10.1. Reactivity
Reactive with oxidizing agents, acids and halogens. May react and degrade some types of plastics, rubbers and coatings. Vapors may form an explosive mixture with air.

10.2. Chemical stability
Stable when inhibited and stored under normal temperatures. Products may destabilize if subjected to extreme heat conditions. This product may form explosive peroxides; this product is listed in some references as shock sensitive. DCPD will decompose to cyclopentadiene at temperatures >150 °C (302 °F).

10.3. Possibility of hazardous reactions

DCPD can partially polymerize at temperatures above 50 °C (122 °F). These polymer buildups may ignite in air and should be treated as pyrophoric material.

10.4. Conditions to avoid:
Keep away from heat, sparks and open flame. Elevated temperatures. Rapid pressure increases may occur at greater than 150 °C (302 °F) during decomposition to cyclopentadiene.

10.5. Incompatible materials
Oxidizing agents. Peroxides. Acids. Bases. Metal salts.

10.6. Hazardous decomposition products
Upon decomposition, this product emits cyclopentadiene, carbon monoxide, carbon dioxide and/or low molecular weight hydrocarbons.

Section 11 – Toxicological Information

11.1 Health effects associated with ingredients
Skin corrosion/irritation
Causes skin irritation.
Serious eye damage/eye irritation
Causes serious eye irritation.
Respiratory or skin sensitization
No data available.
Germ cell mutagenicity
No data available.
Carcinogenicity
Not classified.
Reproductive toxicity
No data available.
Specific target organ toxicity - single exposure
May cause respiratory irritation.
Specific target organ toxicity - repeated exposure
No data available.
Aspiration hazard
May be fatal if swallowed and enters airways.

Section 12 – Ecological Information

12.1.Ecotoxicity
Acute toxicity (aquatic life):
Fish: LC 50 (*Oryzias latipes*, 96 h): 4.3 mg/l Toxic to aquatic life.
Invertebrates: EC 50 (Water Flea, 48 h): 8.0 mg/l Toxic to aquatic life.
Algae: EC 50 (Green algae (*Selenastrum capricornutum*), 96 h): > 27 mg/l Harmful to aquatic life.
Chronic toxicity (aquatic life):
Fish: Toxic to aquatic life with long lasting effects.
Invertebrates: Toxic to aquatic life with long lasting effects.
Algae: Toxic to aquatic life with long lasting effects.

12.2. Bioaccumulative potential

In fish: Carp, Bioconcentration Factor (BCF): 58.9 - 384
Partition Coefficient n-octanol / water (log Kow) Product: 2.78

12.3. Mobility in soil
Minimal partitioning into sediment. DCPD has high affinity for soil adsorption.

12.4. Persistence and Degradability
Direct photodegradation is expected with DCPD, with an estimated half-life of 1 to 3 hours.

12.5. Other adverse effects
Not available.

Section 13 – Disposal Considerations

13.1. Disposal methods
Disposal instructions: Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal. Waste generators are advised to carefully consider hazardous properties and control measures needed for other materials that may be found in the waste.
Contaminated Packaging: Check local, federal and state environmental regulations prior to disposal.

Section 14 – Transport Information

14.1. DOT

UN proper shipping name	UN 2048		
	UN proper shipping name	Dicyclopentadiene	
Transport hazard class(es)	3		
Packing Group	III		
Marine Pollutant:	No		

Section 15 – Regulatory Information

15.1. US Regulations
US Federal Regulations: Not listed
Superfund Amendments and Reauthorization Act of 1986 (SARA): Not listed
US State Regulations: California: Listed
US TSCA Inventory: Listed

15.2. Canada DSL Inventory List: Listed

Section 16 : Additional Information

16.1. List of abbreviation and acronyms used in this MSDS
SDS : Safety Data Sheets
Index N° : atomic number of the element most characteristic of the properties of the substance
CAS No : Chemical Abstracts Service number
EC No : EINECS Number : European Inventory of Existing Commercial Substances
Repr. Cat. 2 : Substance presumed human reproductive toxicant
Acute Oral Cat. 5 : Substance which is of relatively low acute oral toxicity.

GHS : Globally Harmonised System of Classification and Labelling
LD_{50} : Median Lethal Dose
LC_{50} : Lethal Concentration, 50%
N.A. : Not Applicable
OSHA : Occupational Safety & Health Administration
Cal OSHA : The State of California Division of Occupational Safety and Health (DOSH)
PEL : Permissible Exposure Limits
ACGIH : American Conference of Governmental Industrial Hygienists
TLV : Threshold Limit Value
Japanese MITI : Japanese Ministry of International Trade and Industry
EC_{50} : Half maximal effective concentration
UN : United Nations
U.S. EPA TSCA Inventory: Inventory of the chemical substances manufactured or processed in the United States according to Toxic Substances Control Act compiled and published under the autority of the Environmental Protection Agency
Canadian DSL: Canadian Domestic Substances List

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