



Safety Data Sheet

The Dow Chemical Company

Product Name: CYCLOTENE* 3022 - 35 Advanced Electronics Resin

Revision Date: 2005/12/07

Print Date: 10 Aug 2006

The Dow Chemical Company encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

1. Identification of the substance/preparation and of the company/undertaking

Product Name

CYCLOTENE* 3022 - 35 Advanced Electronics Resin

Use of the substance/preparation

Polymer dielectric in microelectronic applications.

COMPANY IDENTIFICATION

The Dow Chemical Company
2030 Willard H. Dow Center
48674 Midland, MI
USA

Customer Information Number: 800-258-2436

EMERGENCY TELEPHONE NUMBER

24-Hour Emergency Contact: 989-636-4400

2. Composition/information on ingredients

Component	Amount	Classification:	CAS #	EC #
B-Staged divinylsiloxane-bis-benzocyclobutene resin	>= 25.0 - <= 45.0 %	R53	124221-30-3	417-830-8
Mesitylene; 1,3,5-trimethylbenzene	>= 50.0 - <= 70.0 %	R10; Xi: R37; N: R51, R53	108-67-8	203-604-4
Quinoline, 1,2-dihydro-2,2,4-trimethyl-, polymers	>= 0.1 - <= 5.0 %	R43; R52/53	26780-96-1	polymer

See Section 16 for full text of R-phrases.

3. Hazards Identification

Flammable.

Irritating to respiratory system.

May cause sensitization by skin contact.

Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

* Indicates a Trademark

4. First-aid measures

Eye Contact: Immediately flush eyes with water; remove contact lenses, if present, after the first 5 minutes, then continue flushing eyes for at least 15 minutes. Obtain medical attention without delay, preferably from an ophthalmologist.

Skin Contact: Remove material from skin immediately by washing with soap and plenty of water. Remove contaminated clothing and shoes while washing. Seek medical attention if irritation persists. Wash clothing before reuse. Discard items which cannot be decontaminated, including leather articles such as shoes, belts and watchbands.

Inhalation: Move person to fresh air. If not breathing, give artificial respiration; if by mouth to mouth use rescuer protection (pocket mask, etc). If breathing is difficult, oxygen should be administered by qualified personnel. Call a physician or transport to a medical facility.

Ingestion: Do not induce vomiting. Call a physician and/or transport to emergency facility immediately.

Notes to Physician: If lavage is performed, suggest endotracheal and/or esophageal control. Danger from lung aspiration must be weighed against toxicity when considering emptying the stomach. The decision of whether to induce vomiting or not should be made by a physician. Respiratory symptoms, including pulmonary edema, may be delayed. Persons receiving significant exposure should be observed 24-48 hours for signs of respiratory distress. Maintain adequate ventilation and oxygenation of the patient. If burn is present, treat as any thermal burn, after decontamination. No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.

Medical Conditions Aggravated by Exposure: Skin contact may aggravate preexisting dermatitis.

5. Fire Fighting Measures

Extinguishing Media: Water fog or fine spray. Dry chemical fire extinguishers. Carbon dioxide fire extinguishers. Foam. General purpose synthetic foams (including AFFF type) or protein foams are preferred if available. Alcohol resistant foams (ATC type) may function.

Fire Fighting Procedures: Keep people away. Isolate fire and deny unnecessary entry. Stay upwind. Keep out of low areas where gases (fumes) can accumulate. Use water spray to cool fire exposed containers and fire affected zone until fire is out and danger of reignition has passed. Fight fire from protected location or safe distance. Consider the use of unmanned hose holders or monitor nozzles. Do not use direct water stream. May spread fire. Eliminate ignition sources. Burning liquids may be moved by flushing with water to protect personnel and minimize property damage. Avoid accumulation of water. Product may be carried across water surface spreading fire or contacting an ignition source. Contain fire water run-off if possible. Fire water run-off, if not contained, may cause environmental damage. Review the "Accidental Release Measures" and the "Ecological Information" sections of this (M)SDS.

Special Protective Equipment for Firefighters: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves). If protective equipment is not available or not used, fight fire from a protected location or safe distance.

Unusual Fire and Explosion Hazards: Container may vent and/or rupture due to fire. Violent steam generation or eruption may occur upon application of direct water stream to hot liquids. Electrically ground and bond all equipment. Flammable mixtures of this product are readily ignited even by static discharge. Vapors are heavier than air and may travel a long distance and accumulate in low lying areas. Ignition and/or flash back may occur. Dense smoke is produced when product burns.

Hazardous Combustion Products: During a fire, smoke may contain the original material in addition to combustion products of varying composition which may be toxic and/or irritating. Combustion products may include and are not limited to: Carbon monoxide. Carbon dioxide. Combustion products may include trace amounts of: Aromatic hydrocarbons.

6. Accidental Release Measures

Steps to be Taken if Material is Released or Spilled: Pump with explosion-proof equipment. If available, use foam to smother or suppress. Contain spilled material if possible. Use non-sparking tools in cleanup operations. Absorb with materials such as: Sand. Sawdust. See Section 13, Disposal Considerations, for additional information.

Personal Precautions: Isolate area. Vapor explosion hazard. Keep out of sewers. Keep upwind of spill. Ventilate area of leak or spill. Keep unnecessary and unprotected personnel from entering the area. No smoking in area. Eliminate all sources of ignition in vicinity of spill or released vapor to avoid fire or explosion. Ground and bond all containers and handling equipment. See Section 10 for more specific information. Refer to Section 7, Handling, for additional precautionary measures. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection.

Environmental Precautions: Material may float on water and any runoff may create an explosion or fire hazard if ignited. Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information.

7. Handling and Storage

Handling

General Handling: Avoid contact with eyes, skin, and clothing. Avoid breathing vapor. Do not swallow. Wash thoroughly after handling. Keep away from heat, sparks and flame. Keep container closed. Use with adequate ventilation. No smoking, open flames or sources of ignition in handling and storage area. Vapors are heavier than air and may travel a long distance and accumulate in low lying areas. Ignition and/or flash back may occur. Electrically ground and bond all equipment. Use of non-sparking or explosion-proof equipment may be necessary, depending upon the type of operation. Containers, even those that have been emptied, can contain vapors. Do not cut, drill, grind, weld, or perform similar operations on or near empty containers. See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.

Storage

Minimize sources of ignition, such as static build-up, heat, spark or flame. See Section 10 for more specific information.

Storage temperature: < 40 °C

8. Exposure Controls / Personal Protection

Exposure Limits

Component	List	Type	Value
Mesitylene; 1,3,5-trimethylbenzene	Ireland OELV	TWA	100 mg/m3 20 ppm
	EU IOELV	TWA	100 mg/m3 20 ppm
	ACGIH	TWA	25 ppm
	UK WEL	TWA	125 mg/m3 25 ppm

Personal Protection

Eye/Face Protection: Use chemical goggles. Chemical goggles should be consistent with EN 166 or equivalent. If exposure causes eye discomfort, use a full-face respirator.

Skin Protection: Use protective clothing chemically resistant to this material. Selection of specific items such as face shield, boots, apron, or full body suit will depend on the task. Remove contaminated clothing immediately, wash skin area with soap and water, and launder clothing before reuse or dispose of properly. Items which cannot be decontaminated, such as shoes, belts and watchbands, should be removed and disposed of properly.

Hand protection: Use chemical resistant gloves classified under Standard EN374: Protective gloves against chemicals and micro-organisms. Examples of preferred glove barrier materials include: Polyethylene. Ethyl vinyl alcohol laminate ("EVAL"). Viton. Polyvinyl chloride ("PVC" or "vinyl"). Styrene/butadiene rubber. Polyvinyl alcohol ("PVA"). Examples of acceptable glove barrier materials include: Butyl rubber. Neoprene. Chlorinated polyethylene. Natural rubber ("latex"). Nitrile/butadiene rubber ("nitrile" or "NBR"). When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374) is recommended. When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374) is recommended. NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/specifications provided by the glove supplier.

Respiratory Protection: Atmospheric levels should be maintained below the exposure guideline. When respiratory protection is required, use an approved air-purifying or positive-pressure supplied-air respirator depending on the potential airborne concentration. For emergency and other conditions where the exposure guideline may be exceeded, use an approved positive-pressure self-contained breathing apparatus or positive-pressure air line with auxiliary self-contained air supply. In confined or poorly ventilated areas, use an approved self-contained breathing apparatus or positive pressure air line with auxiliary self-contained air supply. Use the following CE approved air-purifying respirator: Organic vapor cartridge, type A (boiling point >65 °C)

Ingestion: Avoid ingestion of even very small amounts; do not consume or store food or tobacco in the work area; wash hands and face before smoking or eating.

Engineering Controls

Ventilation: Use only with adequate ventilation. Provide general and/or local exhaust ventilation to control airborne levels below the exposure guidelines.

9. Physical and Chemical Properties

Physical State	Liquid
Color	Yellow
Odor	Aromatic
Flash Point - Closed Cup	44 °C <i>Literature</i> (setaflash)
Flammable Limits In Air	Lower: 0.88 %(V) <i>Literature</i> Upper: 6.1 %(V) <i>Literature</i>
Autoignition Temperature	559 °C <i>Literature</i>
Vapor Pressure	3.3 hPa @ 25 °C <i>Literature</i>
Boiling Point (760 mmHg)	162 °C <i>Literature</i>
Vapor Density (air = 1)	4.1 <i>Literature</i>
Specific Gravity (H2O = 1)	0.9521 <i>Literature</i>
Freezing Point	No test data available
Melting Point	Not applicable
Solubility in Water (by weight)	0.1 %
pH	<i>Not applicable</i>
Kinematic Viscosity	14 mm ² /s @ 25 °C <i>Supplier</i>

10. Stability and Reactivity

Stability/Instability

Stable under recommended storage conditions. See Storage, Section 7. Unstable at elevated temperatures.

Conditions to Avoid: Avoid temperatures above 40°C (104°F) Can react with itself at temperatures above 100°C (212°F) Active ingredient decomposes at elevated temperatures. Avoid static discharge.

Incompatible Materials: Avoid contact with: Strong oxidizers.

Hazardous Polymerization

Can occur. Can react with itself at temperatures above 100°C (212°F)

Thermal Decomposition

Decomposition products depend upon temperature, air supply and the presence of other materials.

11. Toxicological Information

Acute Toxicity

Ingestion

Low toxicity if swallowed. Small amounts swallowed incidentally as a result of normal handling operations are not likely to cause injury; however, swallowing larger amounts may cause injury. Aspiration into the lungs may occur during ingestion or vomiting, causing lung damage or even death due to chemical pneumonia.

Single dose oral LD50 has not been determined.

Eye Contact

May cause moderate eye irritation. May cause moderate corneal injury. Vapor may cause eye irritation experienced as mild discomfort and redness.

Skin Contact

Prolonged contact may cause skin irritation with local redness. Repeated contact may cause skin burns. Symptoms may include pain, severe local redness, swelling, and tissue damage. May cause drying and flaking of the skin. May cause more severe response on covered skin (under clothing, gloves).

Skin Absorption

Prolonged skin contact is unlikely to result in absorption of harmful amounts.

The dermal LD50 has not been determined.

Inhalation

Vapor concentrations are attainable which could be hazardous on single exposure. Excessive exposure may cause irritation to upper respiratory tract (nose and throat) and lungs. Symptoms of excessive exposure may be anesthetic or narcotic effects; dizziness and drowsiness may be observed.

Sensitization

Skin

A component in this mixture has caused allergic skin reactions in humans.

Repeated Dose Toxicity

Contains component(s) which have been reported to cause effects on the following organs in animals: Liver. Lung. Central nervous system. Blood.

Developmental Toxicity

Contains component(s) which caused birth defects in laboratory animals only at doses toxic to the mother. Contains component(s) which, in laboratory animals, have been toxic to the fetus only at doses toxic to the mother.

Reproductive Toxicity

In animal studies on component(s), effects on reproduction were seen only at doses that produced significant toxicity to the parent animals.

Genetic Toxicology

For the component(s) tested: In vitro genetic toxicity studies were negative. Animal genetic toxicity studies were negative.

12. Ecological Information

CHEMICAL FATE

Data for Component: **Mesitylene; 1,3,5-trimethylbenzene**

Movement & Partitioning

Bioconcentration potential is moderate (BCF between 100 and 3000 or Log Pow between 3 and 5). Potential for mobility in soil is low (Koc between 500 and 2000).

Henry's Law Constant (H): 1.97E-2 atm*m3/mole; 25 °C Estimated

Partition coefficient, n-octanol/water (log Pow): 3.42 Measured

Partition coefficient, soil organic carbon/water (Koc): 700 Estimated

Bioconcentration Factor (BCF): 23 - 342; fish; Measured

Persistence and Degradability

Material is not readily biodegradable according to OECD/EC guidelines. Biodegradation rate may increase in soil and/or water with acclimation.

Indirect Photodegradation with OH Radicals

Rate Constant	Atmospheric Half-life	Method
3.51E-11 cm3/s	3.7 h	Estimated

OECD Biodegradation Tests:

Biodegradation	Exposure Time	Method
0 %	28 d	OECD 301C Test

Theoretical Oxygen Demand: 3.19 mg/mg

Data for Component: **Quinoline, 1,2-dihydro-2,2,4-trimethyl-, polymers**

Persistence and Degradability

Material is not readily biodegradable according to OECD/EC guidelines.

OECD Biodegradation Tests:

Biodegradation	Exposure Time	Method
0 %	28 d	OECD 301C Test

ECOTOXICITY

Data for Component: **Mesitylene; 1,3,5-trimethylbenzene**

Material is toxic to aquatic organisms (LC50/EC50/IC50 between 1 and 10 mg/L in most sensitive species).

Fish Acute & Prolonged Toxicity

LC50, Japanese medaka (*Oryzias latipes*): 8.6 mg/l

LC50, goldfish (*Carassius auratus*): 12.5 mg/l

Aquatic Invertebrate Acute Toxicity

LC50, water flea *Daphnia magna*: 50 mg/l

Aquatic Plant Toxicity

EC50, alga *Scenedesmus* sp., biomass growth inhibition: 25 mg/l

Aquatic Invertebrates Chronic Toxicity Value:

ChV Value mg/l	Species	Test Type	Endpoint	Exposure Time
2.8 mg/l	water flea <i>Daphnia magna</i>		number of offspring	21 d

13. Disposal Considerations

This product, when being disposed of in its unused and uncontaminated state should be treated as a hazardous waste according to EC Directive 91/689/EEC. Any disposal practices must be in compliance with all national and provincial laws and any municipal or local by-laws governing hazardous waste. For used, contaminated and residual materials additional evaluations may be required. Do not dump into any sewers, on the ground, or into any body of water.

14. Transport Information

ROAD & RAIL

Proper Shipping Name: RESIN SOLUTION

Hazard Class: 3 ID Number: UN1866 Packing Group: PG III

Classification: F1

Kemler Code: 30

Tremcard Number: 30GF1-III

Special prov. 640E / Special prov. 640E

OCEAN

Proper Shipping Name: RESIN SOLUTION

Hazard Class: 3 ID Number: UN1866 Packing Group: PG III

EMS Number: F-E,S-E

Marine pollutant.: No

AIR

Proper Shipping Name: RESIN SOLUTION

Hazard Class: 3 ID Number: UN1866 Packing Group: PG III

Cargo Packing Instruction: 310

Passenger Packing Instruction: 309

INLAND WATERWAYS

Proper Shipping Name: RESIN SOLUTION

Hazard Class: 3 ID Number: UN1866 Packing Group: PG III

Classification: F1

Kemler Code: 30

Tremcard Number: 30GF1-III

Special prov. 640E / Special prov. 640E

15. Regulatory Information

US. Toxic Substances Control Act

All components of this product are on the TSCA Inventory or are exempt from TSCA Inventory requirements under 40 CFR 720.30

European Inventory of Existing Commercial Chemical Substances (EINECS)

The components of this product are on the EINECS inventory or are exempt from inventory requirements.

EC Classification and User Label Information

Hazard Symbol :

- Xi - Irritant.
- N - Dangerous for the environment.

Risk Phrases :

- R10 - Flammable.
- R37 - Irritating to respiratory system.
- R43 - May cause sensitization by skin contact.
- R51/53 - Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases :

- S16 - Keep away from sources of ignition - no smoking.
- S36/37/39 - Wear suitable protective clothing, gloves and eye/face protection.
- S61 - Avoid release to the environment. Refer to special instructions/Safety data sheets.

Contains: Quinoline, 1,2-dihydro-2,2,4-trimethyl-, polymers

16. Other Information

Risk-phrases in Section 2

R10	Flammable.
R37	Irritating to respiratory system.
R43	May cause sensitization by skin contact.
R51/53	Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
R52/53	Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
R53	May cause long-term adverse effects in the aquatic environment.

Revision

Identification Number: 50612 / 1001 / Issue Date 2005/12/07 / Version: 4.0

Most recent revision(s) are noted by the bold, double bars in left-hand margin throughout this document.

Legend

N/A	Not available
W/W	Weight/Weight
OEL	Occupational Exposure Limit
STEL	Short Term Exposure Limit
TWA	Time Weighted Average
ACGIH	American Conference of Governmental Industrial Hygienists, Inc.
DOW IHG	Dow Industrial Hygiene Guideline
WEEL	Workplace Environmental Exposure Level
HAZ_DES	Hazard Designation
EU ELV	EU Exposure Limit Values Data

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