

MATERIAL SAFETY DATA SHEET

Product: Fluorinated Polyether Copolymers
Trade Name: ZP-49, ZP-51
Supplier: Zen Photonics Co., Ltd.

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1. CHEMICAL PRODUCT & COMPANY IDENTIFICATION

Emergency phone numbers: 82-42-869-0302

Product: Optical Fluorinated polyethers resin

Trade Name: ZP-49, ZP-51

Effective Date: 01/10/2002 Date Printed: 01/10/2002

Supplier: Zen Photonics Co., Ltd.

Address: 104-11 Moonji-Dong, Yusong-Gu Daejeon 305-380, South Korea

Customer Information Center: 82-42-869-0333

2. COMPOSITION INFORMATION ON INGREDIENTS

Fluorinated polyether copolymers	30 – 45 %
Cyclohexanone CAS# 000108-94-1	55 – 70 %

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Light yellow viscose liquid has Acetone and peppermint odor and could be combustible. It may cause eye irritation and allergic skin reaction. It may be harmful if inhaled.

POTENTIAL HEALTH EFFECTS

EYE: This material may cause moderate irritation like corneal injury. Its vapors may irritate eyes.

SKIN: Prolonged or repeated exposure may cause skin irritation, itchy, pain, etc. and may cause drying or flaking of skin. A single prolonged exposure is not likely to result from the material being absorbed through skin in harmful amounts.

INGESTION: Small amounts swallowed accidentally during normal handling operations are not likely to cause injury. Swallowing larger amounts may cause stomachache, emesis, lung injury, etc. If aspirated (liquid enters the lung), it may cause lung damage.

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INHALATION: Excessive exposure may cause irritation inside respiratory tract and lungs, and also may cause vertigo and emesis. The signs and symptoms of excessive exposure may be anesthetic or narcotic effects.

SYSTEMIC (OTHER TARGET ORGAN) EFFECTS: Repeated excessive exposures may cause drying or flaking of skin and do damage liver and adrenal.

CANCER INFORMATION: The available data are inadequate to evaluate the carcinogenicity of this material.

4. FIRST AID

EYES: For even minor eye contact, immediately irrigate with flowing water and continue to do for 15 minutes. Consult a medical.

SKIN: Wash off the contaminated body in flowing water or shower. Consult a medical.

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

INHALATION: Remove to fresh air. If not breathing, try artificial respiration. If breathing is difficult, oxygen should be administered by a qualified personnel. Call a physician or transport to a medical facility immediately.

NOTE TO PHYSICIAN: Treatment based on judgment of the physician in response to reactions of the patient.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT: 43.9 (111 °F)

AUTOIGNITION TEMPERATURE : 420 (788 °F)

FLAMMABILITY LIMITS

LFL: 1.1 % UFL: 9.4 %

*Based on cyclohexanone.

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HAZARDOUS COMBUSTION PRODUCTS: Under fire conditions, polymers decompose. The smoke may contain polymer fragments of varying compositions in addition to unidentified toxic and/or irritating compounds. Hazardous compounds may include carbon monoxide and carbon dioxide and are not limited to carbon monoxide and carbon dioxide.

OTHER FLAMMABILITY INFORMATION: Dense smoke is produced when product burns. Vapors are heavier than air and may travel a long distance and accumulate in low areas. Ignition and/or flash back may occur. Contact with strong oxidizers may cause fire also. Vapors can form flammable mixtures if slightly heated. Surfaces that are hot enough may ignite liquid product in the absence of sparks or flame. Remove all possible ignition sources such as cigarettes, flames, pilot lights, electric sources, etc.

EXTINGUISHING MEDIA: Water stream, carbon dioxide, dry chemical, foam. General synthetic foams are preferred if available.

MEDIA TO BE AVOIDED: No available documents.

FIRE FIGHTING INSTRUCTIONS: Keep people away, isolate fire area and deny unnecessary entry. Restrain fire from spreading if possible. Run fire-fighting wafer off, if it may not cause environmental damages.

PROTECTIVE EQUIPMENT FOR FIREFIGHTERS: Wear positive-pressure self-contained breathing apparatus and protective clothing (including fire fighting helmet, coat, pants, boots, gloves, etc.). If protective equipment is not available or not used, fight fire away from a protected location or safe distance.

6. ACCIDENTAL RELEASE MEASURES

PROTECT PEOPLE: Keep unnecessary people away, isolate hazard area and deny unnecessary entry.

PROTECT THE ENVIRONMENT: Vapor explosion hazard, Keep the material out of

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sewers. Pump with explosion-proof equipment. If available, use the foam to smother or suppress. Eliminate all sources of ignition in vicinity of spilled or released vapor to avoid fire or explosion.

CLEANUP: Use inert absorbent material such as sand or sawdust. Under some conditions of use, application of clay or cellulose based absorbents on spills of this material may result in the generation of flammable vapors, because there is a heat of absorption and a high surface area. Pump up (with appropriate explosion-proof equipment) or soak up with sand or other absorbent. Application of vapor suppression foams may be appropriate. Ventilate the contaminated area and wash after the spilled material is removed completely.

7. HANDLING AND STORAGE

HANDLING: 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. No smoking, open flames or sources of ignition in handling and storage area.

STORAGE: Use of non-sparking or explosion proof equipment may be necessary, depending upon the type of operation. Minimize the sources of ignition such as static buildup, heat, spark, flame, etc. in the storage area.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

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

PERSONAL PROTECTIVE EQUIPMENT

EYE/FACE PROTECTION: Wear chemical goggles. If vapor exposure cause eye discomfort, use a full face respirator.

SKIN PROTECTION: When prolonged or frequently repeated contact could occur,

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wear protective clothing impervious to this material. Selection of specific items such as face-shield, gloves, boots, apron, or full-body suit will depend on operation.

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 potential airborne concentration. For emergency and other conditions where the exposure guideline may be greatly exceeded, use an approved positive-pressure self-contained breathing apparatus or positive-pressure airline with auxiliary self-contained air supply. In confined or poorly ventilated area, use an approved positive-pressure supplied-air respirator.

EXPOSURE GUIDELING: Cyclohexanone : ACGIH Threshold Limit Value (TLV) and OSHA Permissible Exposure Limit (PEL) are 25 ppm and 50 ppm, respectively.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Clear pale yellow liquid

ODOR: Acetone and peppermint odor

VAPOR PRESSURE: 4.5 mm Hg @ 20

VAPOR DENSITY: 3.4 (Air = 1)

BOILING POINT: 155 (311 °F)

MELTING POINT: -31 (-24 °F)

SOLUBILITY IN WATER: 15 % @ 10 °C

SPECIFIC GRAVITY: 0.94 @ 25

*Based on cyclohexanone

10. STABILITY AND REACTIVITY

CHEMICAL STABILITY: Stable at ambient temperature and pressure.

CONDITIONS TO AVOID: Avoid heat and ignition sources. Flammable vapors can be released at elevated temperatures. Product can oxidize at elevated temperatures. Solvent in product evaporates readily.

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INCOMPATIBILITY WITH OTHER MATERIALS: Strong oxidizing agent. Strong acid. Amines.

HAZARDOUS DECOMPOSITION PRODUCT: Refer to Section 5 for Hazardous Combustion Products.

HAZARDOUS POLYMERIZATION: Can occur with heat.

11. TOXICOLOGICAL INFORMATION

(See Section 3 for Hazard Identification)

SKIN: The LD50 has not been determined

INGESTION: Single oral dose LD50 has not been determined.

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL FATE

MOVEMENT & PARTITIONING: Based on information for cyclohexanone. Bioconcentration potential is very low (The bioconcentration factor (BCF) is 2.4).

DEGRADATION & TRANSFORMATION: Based on information for cyclohexanone. Biodegradation may occur slowly under aerobic condition.

ECOTOXICITY: Based on information for cyclohexanone. Material is slightly toxic to aquatic organisms on an acute basis (LC50 is below 100 mg/L in most sensitive species).

13. DISPOSAL CONSIDERATIONS

DISPOSAL: Do not dump into any sewers, on the ground, or into any body of water. All disposal methods must be in compliance with all Federal, State/Provincial and local laws and regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. The Zen Photonics Co., Ltd. has no control over the management

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practices or manufacturing processes of parties or using this material. The information presented here pertains only to the product as shipped in its intended condition as described in MSDS Section 2.

FOR UNUSED & UNCONTAMINATED PRODUCT: The preferred options include sending to a licensed, permitted: recycler, reclaimer, incinerator or other thermal destruction device.

14. TRANSPORT INFORMATION

For U.S. Department of Transportation (DOT) regulatory information, if required, consult transportation regulations or product shipping papers.

15. REGULATORY INFORMATION

Regulatory requirements are subject to change and may differ from one location to another; it is the buyer's responsibility to ensure that its activities comply with federal, state or provincial, and local laws. See other sections for health and safety information.