Material Safety Data Sheet

1. PRODUCT AND COMPANY IDENTIFICATION

ULTRA-I™ 123-0.8 POSITIVE Photoresist

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Supplier

ROHM AND HAAS ELECTRONIC MATERIALS LLC
A Subsidiary of The Dow Chemical Company
455 FOREST STREET
MARLBOROUGH, MA 01752 United States

For non-emergency information contact: 215-592-3000

Emergency telephone number
1 800 424 9300
Local emergency telephone number
989-636-4400

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2. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Concentration
Ethyl lactate	97-64-3	40.0 - 50.0 %
2-Heptanone	110-43-0	20.0 - 30.0 %
Electronic grade propylene glycol monomethyl ether	107-98-2	10.0 - 20.0 %
Diazo cresylic resin mixture		1.0 - 10.0 %
Organic Siloxane Surfactant		< 1.0 %

3. HAZARDS IDENTIFICATION

Emergency Overview

Appearance

Form	liquid
Colour	red
Odour	Sweet odor

Hazard Summary	**CAUTION!** Combustible liquid and vapor. Causes irritation to eyes, nose, and respiratory tract. Prolonged, repeated contact, inhalation, ingestion, or absorption through the skin, may cause adverse effects to internal organ systems.

Potential Health Effects
Primary Routes of Entry: Inhalation, ingestion, eye and skin contact, absorption.

Eyes: May cause pain, transient irritation and superficial corneal effects.

Skin: Material may cause irritation.
Prolonged or repeated exposure may have the following effects:
drowsiness
defatting and drying of the skin which can lead to irritation and dermatitis
central nervous system depression
kidney damage
liver damage

Ingestion: Swallowing may have the following effects:
irritation of mouth, throat and digestive tract
Headache
Nausea
Vomiting
Repeated doses may have the following effects:
central nervous system depression
liver damage
kidney damage

Inhalation: Inhalation may have the following effects:
irritation of nose, throat and respiratory tract
Higher concentrations may have the following effects:
systemic effects similar to those resulting from ingestion

Target Organs: Eye
Respiratory System
nervous system
Liver
Kidney
Skin

Carcinogenicity

Not considered carcinogenic by NTP, IARC, and OSHA

4. FIRST AID MEASURES

Inhalation: Remove from exposure. If there is difficulty in breathing, give oxygen. Seek medical attention if symptoms persist.

Skin contact: Wash skin with water. Continue washing for at least 15 minutes. Obtain medical attention if blistering occurs or redness persists.

Eye contact: Immediately flush the eye with plenty of water for at least 15 minutes, holding the eye open. Obtain medical attention if soreness or redness persists.

Ingestion: Wash out mouth with water. Have victim drink 1-3 glasses of water to dilute stomach contents. Induce vomiting if person is conscious. Immediate medical attention is required. Never administer anything by mouth if a victim is losing conciousness, is unconcious or is convulsing.

Notes to physician: Treat symptomatically.

5. FIREFIGHTING MEASURES

Flash point	39 °C (102 °F)
Lower explosion limit	no data available
Upper explosion limit	no data available

Suitable extinguishing media: Use water spray, foam, dry chemical or carbon dioxide.
Keep containers and surroundings cool with water spray.

Specific hazards during firefighting: This product may give rise to hazardous vapors in a fire. Vapors can travel a considerable distance to a source of ignition and result in flashback.

Special protective equipment for firefighters: Wear full protective clothing and self-contained breathing apparatus.

Further information: Pressure may build up in closed containers with possible liberation of combustible vapors.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Wear suitable protective clothing.
Wear respiratory protection.
Eliminate all ignition sources.

Environmental precautions
Prevent the material from entering drains or water courses.
Do not discharge directly to a water source.
Advise Authorities if spillage has entered watercourse or sewer or has contaminated soil or vegetation.

Methods for cleaning up
Contain spills immediately with inert materials (e.g., sand, earth).
Transfer into suitable containers for recovery or disposal.
Finally flush area with plenty of water.

7. HANDLING AND STORAGE

Handling
Use local exhaust ventilation. Avoid contact with eyes, skin and clothing. Keep container tightly closed.

Storage
Storage conditions: Store in original container. Keep away from heat and sources of ignition. Storage area should be: cool dry well ventilated out of direct sunlight
Further information on storage conditions: Keep away from heat, sparks, flame, and other sources of ignition. Practice good personal hygiene to prevent accidental exposure.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure limit(s)

Exposure limits are listed below, if they exist.

Component	Regulation	Type of listing	Value
Ethyl lactate	Rohm and Haas	TWA	5 ppm
2-Heptanone	Rohm and Haas	TWA	30 ppm
2-Heptanone	Rohm and Haas	STEL	90 ppm
2-Heptanone	ACGIH	TWA	50 ppm
2-Heptanone	ACGIH	TWA	50 ppm
2-Heptanone	OSHA P1	TWA	465 mg/m3 100 ppm
2-Heptanone	OSHA P0	TWA	465 mg/m3 100 ppm
2-Heptanone	NIOSH REL	TWA	465 mg/m3 100 ppm
Electronic grade propylene glycol monomethyl ether	Rohm and Haas	TWA	100 ppm
Electronic grade propylene glycol monomethyl ether	Rohm and Haas	STEL	150 ppm
Electronic grade propylene glycol monomethyl ether	ACGIH	TWA	50 ppm
Electronic grade propylene glycol monomethyl ether	ACGIH	TWA	100 ppm
Electronic grade propylene glycol monomethyl ether	ACGIH	STEL	100 ppm
Electronic grade propylene glycol monomethyl ether	ACGIH	STEL	150 ppm
Electronic grade propylene glycol monomethyl ether	OSHA P0	TWA	360 mg/m3 100 ppm
Electronic grade propylene glycol monomethyl ether	OSHA P0	STEL	540 mg/m3 150 ppm
Electronic grade propylene glycol monomethyl ether	NIOSH REL	TWA	360 mg/m3 100 ppm
Electronic grade propylene glycol monomethyl ether	NIOSH REL	ST	540 mg/m3 150 ppm

Exposure controls
Engineering measures: Engineering methods to prevent or control exposure are preferred. Methods include process or personnel enclosure, mechanical ventilation (local exhaust), and control of process conditions.

Individual protection measures

Eye/face protection: Goggles

Skin protection

Hand protection: Butyl rubber gloves. Other chemical resistant gloves may be recommended by your safety professional.

Other protection: Normal work wear.

Respiratory protection: Respiratory protection if there is a risk of exposure to high vapor concentrations. The specific respirator selected must be based on the airborne concentration found in the workplace and must not exceed the working limits of the respirator.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	
Form	liquid
Colour	red
Odour	Sweet odor
pH	ca.7
Boiling point/boiling range	120 - 140 °C (248 - 284 °F)
Flash point	39 °C (102 °F)
Evapouration rate	Slower than ether
Lower explosion limit	no data available
Upper explosion limit	no data available

Component: **Ethyl lactate**
Vapour pressure 1.7 mmHg at 20 °C (68 °F)

Component: **2-Heptanone**
Vapour pressure 2.14 mmHg at 20 °C (68 °F)

Component: **Electronic grade propylene glycol monomethyl ether**
Vapour pressure 10.9 mmHg

Relative vapour density	Heavier than air.
Relative density	1.07
Water solubility	insoluble
VOC's	760 - 1,010 g/L

NOTE: The physical data presented above are typical values and should not be construed as a specification.

10. STABILITY AND REACTIVITY

Chemical stability	Stable under normal conditions.
Hazardous reactions	No dangerous reaction known under conditions of normal use.
Conditions to avoid	Heat, flames and sparks. Static discharge Exposure to sunlight. contact with incompatible materials
Materials to avoid	Strong oxidizing agents Reducing agents Bases Acids
Hazardous decomposition products	Carbon monoxide, carbon dioxide, oxides of sulfur, nitrogen oxides (NOx),
polymerisation	Product will not undergo hazardous polymerization.

11. TOXICOLOGICAL INFORMATION

Toxicological information on this product or its components appear in this section when such data is available.

Carcinogenicity:

Not considered carcinogenic by NTP, IARC, and OSHA

Component: **Ethyl lactate**

Acute oral toxicity LD50 rat > 2,000 mg/kg OECD Test Guideline 425

Component: **2-Heptanone**

Acute oral toxicity LD50 rat 1,670 mg/kg

Component: **Electronic grade propylene glycol monomethyl ether**

Acute oral toxicity LD50 rat 4,016 mg/kg

Component: **Diazo cresylic resin mixture**

Acute oral toxicity Single dose oral LD50 has not been determined.

Component: **Organic Siloxane Surfactant**

Acute oral toxicity Very low toxicity if swallowed.
Harmful effects not anticipated from swallowing small amounts.

Component: **2-Heptanone**

Acute inhalation toxicity 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.

Component: **2-Heptanone**

Acute inhalation toxicity LC50 rat 4 Hour 9.34 - 18.7 mg/l

Component: **Electronic grade propylene glycol monomethyl ether**

Acute inhalation toxicity Brief exposure (minutes) is not likely to cause adverse effects. The odor is objectionable at 100 ppm; higher levels produce eye, nose, and throat irritation and are intolerable at 1000 ppm. Anesthetic effects are seen at or above 1000 ppm.

Component: **Electronic grade propylene glycol monomethyl ether**

Acute inhalation toxicity LC50 rat 6 Hour > 25.8 mg/l

Component: **Diazo cresylic resin mixture**

Acute inhalation toxicity The LC50 has not been determined.

Component: **Organic Siloxane Surfactant**

Acute inhalation toxicity No adverse effects are anticipated from single exposure to dust.

Component: **Ethyl lactate**

Acute dermal toxicity LD50 rat > 5,000 mg/kg

Component: **2-Heptanone**

Acute dermal toxicity LD50 rabbit 10,289 mg/kg

Component: **Electronic grade propylene glycol monomethyl ether**

Acute dermal toxicity LD50 rabbit > 2,000 mg/kg

Component: **Diazo cresylic resin mixture**

Acute dermal toxicity The dermal LD50 has not been determined.

Component: **Organic Siloxane Surfactant**

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

Component: **2-Heptanone**

Skin irritation 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.

Component: **Electronic grade propylene glycol monomethyl ether**

Skin irritation No skin irritation
Prolonged contact may cause slight skin irritation with local redness.
Repeated contact may cause slight skin irritation with local redness.

Component: **Diazo cresylic resin mixture**

Skin irritation no data available

Component: **Organic Siloxane Surfactant**

Skin irritation No relevant data found.

Component: **Ethyl lactate**

Eye irritation Eye irritation
Single application to the rabbit eye produced conjunctival irritation.

Component: **2-Heptanone**

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

Component: **Electronic grade propylene glycol monomethyl ether**
Eye irritation No eye irritation
May cause slight temporary eye irritation.
Corneal injury is unlikely.

Component: **Diazo cresylic resin mixture**
Eye irritation no data available

Component: **Organic Siloxane Surfactant**
Eye irritation No relevant data found.

Component: **Ethyl lactate**
Sensitisation no data available

Component: **2-Heptanone**
Sensitisation Did not cause allergic skin reactions when tested in humans.
Did not cause allergic skin reactions when tested in guinea pigs.

Component: **2-Heptanone**
Sensitisation For respiratory sensitization:
No relevant data found.

Component: **Electronic grade propylene glycol monomethyl ether**
Sensitisation Did not cause allergic skin reactions when tested in guinea pigs.

Component: **Electronic grade propylene glycol monomethyl ether**
Sensitisation For respiratory sensitization:
No relevant data found.

Component: **Diazo cresylic resin mixture**
Sensitisation No relevant information found.

Component: **Organic Siloxane Surfactant**
Sensitisation No relevant data found.

Component: **Organic Siloxane Surfactant**
Sensitisation No relevant data found.

Component: **Ethyl lactate**
Carcinogenicity: no data available
Component: **Ethyl lactate**
Reproductive toxicity
no data available
Component: **Ethyl lactate**
Teratogenicity
Development effects were not observed in laboratory animals.
Component: **Ethyl lactate**
Mutagenicity
Reverse mutation test using bacteria: Non-mutagenic with and without metabolic activation

Component: **2-Heptanone**

Subchronic toxicity In animals, effects have been reported on the following organs:
Central nervous system.
Kidney.
Liver.

Component: **2-Heptanone**

Carcinogenicity: No relevant data found.

Component: **2-Heptanone**

Reproductive toxicity

Screening studies suggest that this material does not affect reproduction.

Component: **2-Heptanone**

Teratogenicity

No relevant data found.

Component: **2-Heptanone**

Mutagenicity

In vitro genetic toxicity studies were negative.

Component: **Electronic grade propylene glycol monomethyl ether**

Subchronic toxicity Symptoms of excessive exposure may be anesthetic or narcotic effects; dizziness and drowsiness may be observed.
In animals, effects have been reported on the following organs:
Kidney.
Liver.

Component: **Electronic grade propylene glycol monomethyl ether**

Carcinogenicity: Did not cause cancer in laboratory animals.

Component: **Electronic grade propylene glycol monomethyl ether**

Reproductive toxicity

In laboratory animal studies, effects on reproduction have been seen only at doses that produced significant toxicity to the parent animals.

Component: **Electronic grade propylene glycol monomethyl ether**

Teratogenicity

Has been toxic to the fetus in laboratory animals at doses toxic to the mother. Did not cause birth defects in laboratory animals.

Component: **Electronic grade propylene glycol monomethyl ether**

Mutagenicity

In vitro genetic toxicity studies were negative. Animal genetic toxicity studies were negative.

Component: **Diazo cresylic resin mixture**

Subchronic toxicity No data available

Component: **Diazo cresylic resin mixture**

Carcinogenicity: No relevant information found.

Component: **Diazo cresylic resin mixture**

Reproductive toxicity

No relevant information found.

Component: **Diazo cresylic resin mixture**

Teratogenicity

No relevant information found.

Component: **Diazo cresylic resin mixture**

Mutagenicity

no data available

Component: **Organic Siloxane Surfactant**
Subchronic toxicity No relevant data found.

Component: **Organic Siloxane Surfactant**
Carcinogenicity: No relevant data found.
Component: **Organic Siloxane Surfactant**
Reproductive toxicity
No relevant data found.
Component: **Organic Siloxane Surfactant**
Teratogenicity
No relevant data found.
Component: **Organic Siloxane Surfactant**
Mutagenicity
No relevant data found.

12. ECOLOGICAL INFORMATION

Ecotoxicological information on this product or its components appear in this section when such data is available.

Ethyl lactate
Elimination information (persistence and degradability)
Biodegradability OECD Test Guideline 302
75 %

Ecotoxicity effects
Toxicity to fish LC50 Zebra fish (Danio/Brachydanio rerio) 96 Hour OECD Test Guideline 203 or Equivalent
320 mg/l

Toxicity to algae ErC50 green alga Pseudokirchneriella subcapitata (formerly known as Selenastrum capricornutum) 96 Hour
3,500 mg/l

Toxicity to aquatic invertebrates EC50 Daphnia magna (Water flea) 48 Hour
560 mg/l

2-Heptanone
Elimination information (persistence and degradability)
Biodegradability
Biodegradation under aerobic static laboratory conditions is moderate (BOD20 or BOD28/ThOD between 10 and 40%).

Ecotoxicity effects
Toxicity to fish Material is practically non-toxic to fish on an acute basis (LC50 > 100 mg/L).

Toxicity to fish static test LC50 Pimephales promelas (fathead minnow) 96 Hour OECD Test Guideline 203 or Equivalent
131 mg/l

Toxicity to algae	EC50 Algae 96 Hour OECD Test Guideline 201 96 mg/l
Toxicity to algae	EC50 Algae (Selenastrum capricornutum) 72 Hour OECD Test Guideline 201 98.2 mg/l
Toxicity to aquatic invertebrates	EC50 Daphnia magna 48 Hour OECD Test Guideline 202 or Equivalent 160 mg/l
Toxicity to aquatic invertebrates	static test EC50 Daphnia magna 48 Hour OECD Test Guideline 202 or Equivalent > 90.1 mg/l
Chemical Fate **Biochemical Oxygen Demand (BOD)**	17.8 %

Electronic grade propylene glycol monomethyl ether

Elimination information (persistence and degradability)

Biodegradability

Material is readily biodegradable. Passes OECD test(s) for ready biodegradability.

Biodegradability	OECD Test Guideline 301E or Equivalent Biodegradable 96 % 10-day Window: Pass

Ecotoxicity effects

Toxicity to fish	Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).
Toxicity to fish	static test LC50 Leuciscus idus (Golden orfe) 96 Hour DIN 38412 6,812 mg/l
Toxicity to fish	semi-static test LC50 Oncorhynchus mykiss (rainbow trout) 96 Hour OECD Test Guideline 203 or Equivalent >= 1,000 mg/l
Toxicity to fish	static test LC50 Pimephales promelas (fathead minnow) 96 Hour OECD Test Guideline 203 or Equivalent 20,800 mg/l
Toxicity to algae	static test ErC50 Pseudokirchneriella subcapitata (green algae) 7 d OECD Test Guideline 201 or Equivalent > 1,000 mg/l
Toxicity to bacteria	static test IC50 activated sludge > 1,000 mg/l

Toxicity to aquatic invertebrates	static test LC50 Daphnia magna (Water flea) 48 Hour OECD Test Guideline 202 or Equivalent 21,100 - 25,900 mg/l
Chemical Fate	
Chemical Oxygen Demand (COD)	1.84 mg/g

Organic Siloxane Surfactant
Elimination information (persistence and degradability)
Biodegradability

No relevant data found.

Bioaccumulation	No data available.
Ecotoxicity effects	
Toxicity to fish	No relevant data found.

13. DISPOSAL CONSIDERATIONS

Environmental precautions: Prevent the material from entering drains or water courses.
Do not discharge directly to a water source.
Advise Authorities if spillage has entered watercourse or sewer or has contaminated soil or vegetation.

Disposal
Dispose in accordance with all local, state (provincial), and federal regulations. Incineration is the recommended method of disposal for containers. Under RCRA, it is the responsibility of the product's user to determine at the time of disposal, whether the product meets RCRA criteria for hazardous waste. This is because the product uses, transformations, mixtures, processes, etc. may render the resulting materials hazardous.
Do not remove label until container is thoroughly cleaned. Empty containers may contain hazardous residues. This material and its container must be disposed of in a safe way.

14. TRANSPORT INFORMATION

DOT

Not regulated per 49CFR 173.150(f)(2)

Classification for SEA transport (IMO-IMDG):

Proper shipping name	RESIN SOLUTION
UN number	UN 1866
Class	3
Packing group	III

Transportation classifications may vary by container volume and may be influenced by regional or country variations in regulations

15. REGULATORY INFORMATION

Workplace Classification
OSHA: Combustible
Irritant

WHMIS: This product is a 'controlled product' under theCanadian Workplace Hazardous Materials Information System (WHMIS).

SARA TITLE III: Section 311/312 Categorizations (40CFR370): Immediate, delayed, flammability hazard

SARA TITLE III: Section 313 Information (40CFR372)
This product does not contain a chemical which is listed in Section 313 at or above de minimis concentrations.

United States TSCA Inventory (US.TSCA): All components of this product are in compliancewith the inventory listing requirements of the U.S. Toxic Substances Control Act (TSCA) Chemical Substance Inventory.

California (Proposition 65)
This product does not contain materials which the State of California has found to cause cancer, birth defects or other reproductive harm.

16. OTHER INFORMATION

NFPA Hazard Rating

Health	Fire	Reactivity
2	2	0

Legend

ACGIH	American Conference of Governmental Industrial Hygienists
BAc	Butyl acetate
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
STEL	Short Term Exposure Limit (STEL):
TLV	Threshold Limit Value
TWA	Time Weighted Average (TWA):
|	Bar denotes a revision from prior MSDS.

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and

may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

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