

PRODUCT NAME: **JSR NFR016D2**

SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Identifier: **JSR NFR016D2**
General Use: Photoresist for Integrated Circuit Production
Product Description: Photosensitizer and Phenolic Resin Solution

MANUFACTURER:
JSR Corporation
1-9-2, Higashi-Shinbashi,
Minato-ku, Tokyo
105-8640 Japan

EMERGENCY TELEPHONE NUMBERS:
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(in USA) 24Hrs Every day
Telephone: +81-3-6218-3592
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DISTRIBUTOR:
JSR Micro Inc.
1280 North Mathilda Ave.,
Sunnyvale, CA 94089
Telephone: +1-408-543-8800

2. HAZARDS IDENTIFICATION

GHS Classification






Hazard Group	Hazard class	Category	
Physical Hazards	Explosives	Not Classified	
	Flammable gases	Not Classified	
	Flammable aerosols	Not Classified	
	Oxidizing gasses	Not Classified	
	Gases under pressure	Not Classified	
	Flammable liquids	Category 3	
	Flammable solids	Not Classified	
	Self-reactive substances and mixtures	Not Classified	
	Pyrophoric liquids	Not Classified	
	Pyrophoric solids	Not Classified	
	Self-heating substances and mixtures	Not Classified	
	Substances and mixtures which, in contact with water, emit flammable gases	Not Classified	
	Oxidizing liquids	Not Classified	
	Oxidizing solids	Not Classified	
	Organic peroxides	Not Classified	
	Corrosive to metals	Not Classified	
Health Hazards	Acute toxicity	Oral	Not Classified
		Dermal	Category 3
		Inhalation (Gasses)	Not Classified
		Inhalation (Vapors)	Category 3
		Inhalation (Dusts and Mists)	Not Classified
	Skin corrosion/irritation	Category 2	
	Serious eye damage/eye irritation	Category 2	
	Respiratory or skin sensitization	Not Classified	
Germ cell Mutagenicity	Not Classified		
Carcinogenicity	Not Classified		

PRODUCT NAME: **JSR NFR016D2**

	Reproductive toxicity	Category 1
	Specific target organ systemic toxicity-Single exposure	Category 1
	Target Organs	Nervous system, blood system, respiratory system, heart, liver, kidney, central nervous system, retina, and systemic toxicity
	Specific target organ systemic toxicity-Repeated exposure	Not Classified
	Target Organs	NA
	Aspiration hazard	Not Classified
Hazardous to the aquatic environment	Acute aquatic toxicity	Category 1
	Chronic aquatic toxicity	Category 3

GHS label elements

Hazard symbols:

Flame	Skull and crossbones	Exclamation mark	Health Hazard	Environmental
				

Signal word: **Danger**

Hazard statement:

- Flammable liquid and vapor.
- Toxic in contact with skin.
- Toxic if inhaled.
- Causes skin irritation.
- Causes serious eye irritation.
- May damage fertility or the unborn child.
- Causes damage to the nervous system, blood system, respiratory system, heart, liver, kidney, central nervous system, retina, and systemic toxicity.
- Very toxic to aquatic life.
- Harmful to aquatic life with long lasting effects.

Precautionary Statements:

Prevention:

- Keep away from heat, sparks, open flames and hot surfaces. – No smoking.
- Keep container tightly closed.
- Ground/Bond container and receiving equipment.
- Use explosion proof electrical, ventilation, lighting and equipment.
- Use only non-sparking tools.
- Take precautionary measures against static discharge.
- Wear protective gloves, protective clothing, eye protection and face protection.
- Do not breathe dust, fumes, gas, mist, vapors or spray.

PRODUCT NAME: **JSR NFR016D2**

- Use only outdoors or in a well-ventilated area.
- Wash hands thoroughly after handling.
- Obtain special instructions before use.
- Do not handle until all safety precautions have been read and understood.
- Do not eat, drink or smoke when using this product.

Response:

- If on skin (or hair): Take off immediately all contaminated clothing and wash it before reuse. Rinse skin with water/shower.
- In case of fire: Use carbon dioxide, alcohol foam or dry chemical to extinguish.
- Call a poison center, doctor or seek medical attention if you feel unwell.
- Specific treatment (see section 4 on this SDS).
- If inhaled: Remove person to fresh air and keep comfortable for breathing.
- If skin irritation occurs: Get medical advice/attention.
- 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.
- If exposed or concerned: Get medical advice/attention.
- If exposed: Call a poison center or doctor.

Storage:

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

Disposal:

- Dispose of contents/containers in accordance with local and federal regulations.

NFPA RATING (Scale 0 – 4): HEALTH = 2, FIRE = 2; REACTIVITY = 0

3. COMPOSITION / INFORMATION ON INGREDIENTS

Component	%	CAS No.
Phenolic resin	20-30	Proprietary
Trisphenol derivative	1-10	Proprietary
Melamine compound	1-10	Proprietary
Photosensitizer	Less than 3	Proprietary
Additive	Less than 3	Proprietary
Methyl 3-methoxypropanoate (MMP)	55-65	3852-09-3
Cresol	Less than 1	1319-77-3
Methanol	Less than 1	67-56-1

*Note- The specific chemical identity and exact percentage of composition of some ingredients have been withheld as a trade secret.

4. FIRST AID MEASURES

INHALATION:

May cause irritation to nose and throat. Remove exposed person to fresh air; perform artificial respiration if necessary.

EYE CONTACT:

Eye contact may cause irritation and corneal injury. Immediately flush eyes with plenty of water at least 15 min. Call a physician.

SKIN CONTACT:

PRODUCT NAME: **JSR NFR016D2**

Prolonged and repeated contact with skin may cause irritation and dermatitis. Flush skin with water and soap.

INGESTION:

Swallowing may cause nausea and pain in esophagus and stomach. Give large quantities of water, contact a poison center and call physician immediately.

NOTE TO PHYSICIAN:

Treatment may vary with condition of victim and specifics of incident.

5. FIRE-FIGHTING MEASURES

GENERAL HAZARD:

Combustible liquid. May release vapors that form flammable mixtures when temperatures are at or above the flash point. Toxic gases will form upon combustion.

EXTINGUISHING MEDIA:

Carbon dioxide, alcohol foam or dry chemical.

SPECIAL FIRE FIGHTING PROCEDURES:

Water should be used to keep fire exposed containers cool and to disperse vapors. Firefighters should wear self-contained breathing apparatus.

FIRE AND EXPLOSION HAZARDS:

Combustible liquid. Toxic gases, smoke, and oxides of carbon will form upon combustion.

6. ACCIDENTAL RELEASE MEASURES

LARGE SPILL/SMALL SPILL:

For indoor spills, provide increased ventilation as required to minimize exposure. Contain, absorb, and cleanup the spill as indicated in the appropriate land or water section below. Dispose of absorbent and other waste in an appropriate chemical waste container. Wear proper personal protective equipment. Wash thoroughly after handling.

LAND SPILL:

Dike or absorb with inert absorbent material and transfer to D.O.T. container for disposal.

WATER SPILL:

Remove from surface by skimming or with suitable absorbent.

7. HANDLING AND STORAGE

GENERAL:

Store in original container in a dry area. Avoid heat, sunlight, and ignition sources. Open only under safe light and well ventilated conditions. Loosen closure cautiously before opening. When using this substance: (a) avoid breathing the substance; (b) avoid ingestion; (c) use respiratory protection when in dust or mist form. Wear chemical goggles, resistant gloves and protective clothing to prevent contact. Wash thoroughly after handling.

RECOMMENDED STORAGE TEMPERATURE:

Maintain the storage temperature below 35°C (95°F). This storage temperature is intended for health and safety purposes only and is valid within the shelf life + 3 month period. For technical applications, see the product specifications and label.

STORAGE PRESSURE:

Atmospheric

INCOMPATIBILITIES:

Strong oxidizing agents, strong acids, strong bases.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

PRODUCT NAME: **JSR NFR016D2**

ENGINEERING CONTROLS:

The use of local exhaust ventilation is recommended to control emissions near the source. Laboratory samples should be handled in a fumehood. Provide mechanical ventilation of confined spaces. Use explosion-proof ventilation equipment.

PERSONAL PROTECTION

RESPIRATORY PROTECTION:

Under conditions of frequent use or heavy exposure, respiratory protection may be needed. Respiratory protection is ranked in order from minimum to maximum. Consider warning properties before use. NIOSH approved respirators as follows:
 Any chemical cartridge respirator with organic vapor cartridge(s).
 Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s).
 Any air-purifying respirator with a full facepiece and an organic vapor canister.
 For Unknown Concentrations or Immediately Dangerous to Life or Health.
 Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.
 Any self-contained breathing apparatus with a full facepiece.

SKIN PROTECTION:

Wear impermeable gloves and clothing during activities where there is potential for direct skin contact with chemical.

EYE PROTECTION:

Wear primary eye protection such as splash resistant safety goggles with a secondary protection faceshield. Provide an emergency eye wash station and quick drench shower in the immediate work area.

EXPOSURE GUIDELINE (S):

OSHA HAZARDS (29 CFR 1910.1200) Exposure Limits 8 hrs. TWA (ppm)

COMPONENT	OSHA PEL	ACGIH TLV
Phenolic resin	Not established	Not established
Trisphenol derivative	Not established	Not established
Melamine compound	Not established	Not established
Photosensitizer	Not established	Not established
Additive	Not established	Not established
MMP	Not established	Not established
Cresol	5 (skin)	5 (skin)
Methanol	200	200 (skin)

9. PHYSICAL AND CHEMICAL PROPERTIES

Properties	Value
Appearance:	Clear and pale yellow liquid
Odor:	Sweet, Ester-like
Odor threshold:	No applicable information available
Vapor Pressure:	2.4 hPa at

Properties	Value
Autoignition Temperature:	385 °C
	725 °F
pH:	No applicable information available
Melting/Freezing Point:	NA °C
	NA °F
Evaporation rate:	No applicable

PRODUCT NAME: **JSR NFR016D2**

	20 °C		information available
Relative Density:	0.9 - 1.1	Flammability:	Category 3
Solubility:	Moderate in water	Vapor Density:	No applicable information available
Boiling Point:	145 °C	Decomposition Temperature:	NA °C
	293 °F		NA °F
Flashpoint and Method:	49 °C (est.)	Partition coefficient:	No applicable information available
	120 °F (est.)		
Flammable Limits:	1.35 % LEL	Viscosity:	No applicable information available
	36 % UFL		

10. STABILITY AND REACTIVITY

POSSIBILITY OF HAZARDOUS REACTIONS:

May react with strong oxidizing agents, strong acids, and strong bases.

CHEMICAL STABILITY:

Materials containing similar structural groups are normally stable. This material maybe sensitive to peroxide formation.

CONDITIONS TO AVOID:

Avoid heat, sunlight and ignition sources.

INCOMPATIBLE MATERIALS:

Strong oxidizing agents, strong acids, strong bases.

HAZARDOUS DECOMPOSITION PRODUCTS:

Combustion will produce toxic vapors and gases.

11. TOXICOLOGICAL INFORMATION

SOLVENT (MMP):

ACUTE TOXICITY

Oral	LD50	Rat	3,700 mg/kg
Inhalation (Vapor)	LC50	Rat	5.8 mg/L

MUTAGENICITY

Ames test:	Negative
Chromosomal aberration test:	Negative

Trisphenol derivative:

ACUTE TOXICITY

Oral	LD50	Rat	>5,000 mg/kg
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MUTAGENICITY

Ames test:	Negative
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Melamine compound:

ACUTE TOXICITY

Oral	LD50	Mouse	1,800 mg/kg
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Photosensitizer:

ACUTE TOXICITY

Oral	LD50	Rat	>2,000 mg/kg
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Additive:

ACUTE TOXICITY

Oral	LD50	Rat	>2,000 mg/kg
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PRODUCT NAME: **JSR NFR016D2**

Cresol:

ACUTE TOXICITY

Oral	LD50	Rat	1,454 mg/kg
Dermal	LD50	Rabbit	200 mg/kg

MUTAGENICITY

Ames test:	Negative
Chromosomal aberration test:	Negative
Micronucleus test:	Negative

Methanol:

ACUTE TOXICITY

Oral	LD50	Human beings	300 mg/kg
Dermal	LD50		300 mg/kg
Inhalation (Vapor)	LC50		3 mg/L

MUTAGENICITY

Ames test:	Negative
Chromosomal aberration test:	Negative
Micronucleus test:	Negative

Phenolic resin: No information available

CARCINOGENICITY:

Cresol:

NTP: No
IARC MONOGRAPHS: No
OSHA Regulated: No
ACGIH: A4 - Not Classifiable as a Human Carcinogen.

The others:

NTP: No, IARC MONOGRAPHS: No, OSHA Regulated: No

For potential routes of exposure, symptoms related to the toxicological characteristics, delayed and immediate effects and chronic effects from short and long-term exposure see Section 4 on this SDS.

12. ECOLOGICAL INFORMATION

SOLVENT (MMP):	Eco toxicity: [Estimated by ECOSAR] Fish: LC50 96hr 196 mg/L (Fish) Crustacean: EC50 48hr 515 mg/L (Daphnid) Algae: EC50 72 or 96hr 269 mg/L (Green Algae)
Trisphenol derivative:	Eco toxicity: Fish: LC50 96hr >100 mg/L (Oryzias latipes) Crustacean: EC50 48hr >100 mg/L (Daphnia magna) Algae: EC50 72 or 96hr >100 mg/L (Pseudokirchneriella subcapitata) Algae: NOEC \geq 100 mg/L (Pseudokirchneriella subcapitata)
Melamine compound:	Eco toxicity: [Estimated by ECOSAR] Fish: LC50 96hr 505.949 mg/L (Fish) Crustacean: EC50 48hr 235.845 mg/L (Daphnid) Algae: EC50 72 or 96hr 53.831 mg/L (Green Algae)
Photosensitizer:	Eco toxicity: [Estimated by ECOSAR] Fish: LC50 96hr 0.054 mg/L (Fish) Crustacean: EC50 48hr 0.342 mg/L (Daphnid) Algae: EC50 72 or 96hr 0.005 mg/L (Green Algae)

PRODUCT NAME: **JSR NFR016D2**

Additive	Eco toxicity: [Estimated by ECOSAR] Fish: LC50 96hr 14.016 mg/L (Fish) Crustacean: EC50 48hr 9.454 mg/L (Daphnid) Algae: EC50 72 or 96hr 3.52 mg/L (Green Algae)
Cresol:	Eco toxicity: Fish: LC50 96hr 10 mg/L (Lepomis macrochirus) Crustacean: EC50 48hr 7 mg/L (Hyalella azteca)
Methanol:	Eco toxicity: Fish: LC50 96hr 28200 mg/L (Pimephales promelas) Crustacean: EC50 48hr 900 mg/L (Brine Shrimp)
Phenolic resin:	No information available

13. DISPOSAL CONSIDERATION

The user of this product must properly characterize the waste generated from the use of this product in accordance with all applicable federal, state and/or local laws and regulations in order to determine the proper disposal of the waste in accordance with all applicable federal, state and/or local laws and regulations.

14. TRANSPORT INFORMATION

TRANSPORTATION AND HAZARDOUS MATERIALS DESCRIPTION:

Package and transport in accordance with Department of Transportation (DOT) and other regulatory agency requirements.

U. S. DOT PROPER SHIPPING NAME:	UN1866, Resin solution, Class 3, III
IATA PROPER SHIPPING NAME:	Resin solution
IDENTIFICATION NUMBER:	UN1866

15. REGULATORY INFORMATION

US

OSHA HAZARD COMMUNICATION STANDARD, 29 CFR 1910.1200: Ensure that the hazards associated with this product are transmitted to employees by means of a hazard communications program, in accordance with federal and state Occupational Safety and Health Administration (OSHA) regulations.

CERCLA/SUPERFUND HAZARD CATEGORY: At the time of this document's preparation, the following ingredients of this product were listed in 40 CFR 302.4: (Less than 1% of Cresol (100 LBS RQ) and Methanol (5000 LBS RQ)). The list should be periodically checked for applicable updates.

SARA 313 INFORMATION: At the time of this document's preparation, the following ingredients of this product were listed in 40 CFR 372. (Less than 1% of Cresol and Methanol) The list should be periodically checked for applicable updates.

PRODUCT NAME: **JSR NFR016D2**

TOXIC SUBSTANCES CONTROL ACT (TSCA): All of the compounds in this product are on the TSCA Inventory and/or are subject to a Low Volume Exemption. The Trisphenol derivative is subject to the significant new use rule (40 CFR 721.5867). In accordance with federal regulations, this material shall be used only to industrially manufacture integrated circuits. In particular, this material shall not be distributed to any person, other than for disposal, until after it has been completely reacted. All users must utilize the worker protection measures and environmental release controls specified in this Safety Data Sheet and in EPA and OSHA regulations. The significant new use rule codified in 40 CFR 721.5867 should be reviewed to ensure hazard communication programs, workplace practices and recordkeeping meet federal requirements. Use of this product without implementing the programs specified in 40 CFR 721.5867 shall be considered a significant new use. Acknowledgment of receipt of this Safety Data Sheet shall be considered acknowledgement that the user will comply with these requirements.

CALIFORNIA PROPOSITION 65 WARNING: At the time of this document's preparation, one or more of the constituents of this product were included on the California Proposition 65 list of chemicals known to cause cancer and birth defects or other reproductive harm. The list should be periodically checked for applicable updates.

Reference Information

Japan

Japan. Enforcement Order of Marine Pollution Prevention Law (Cabinet Order No. 201, Appendix 1 and 1-2, June 22, 1971, as amended through No. 71, May 30, 2014)

CAS RN: Proprietary

Name: Photosensitizer

This product is classified as marine pollutants.

16. OTHER INFORMATION

REVISION SUMMARY

June 6, 1994	Original SDS established.
December 15, 1997	Revision 1 established.
August 6, 1998	Revision 2 established.
April 9, 1999	Revision 3 established.
March 2, 2000	Revision 4 established.
June 12, 2001	Revision 5 established.
January 27, 2005	Revision 6 established.
February 21, 2005	Revision 7 established.
March 25, 2005	Revision 8 established.
December 9, 2005	Revision 9 established.
November 17, 2008	Revision 10 established.
March 30, 2009	Revision 11 established.
September 9, 2013	Revision 12 GHS SDS established.
June 3, 2015	Revision 13 established.
February 5, 2016	Revision 14 established.

To the best of our knowledge, the information contained herein is accurate. However, neither JSR Corporation nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards, which exist.

PRODUCT NAME: **JSR NFR016D2**