

**SUMITOMO**  
Chemical Co., Ltd.

Sumiresist NEB-31 series

Page : 1/7

Date Prepared :13/February/2001

## MATERIAL SAFETY DATA SHEET

### 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name : Sumiresist NEB-31A2/31A3  
General Use : Photoresist

#### MANUFACTURER :

Sumitomo Chemical Co.,Ltd.  
1-98,Kasugade-naka 3-chome,  
Konohana-ku, Osaka, 554-8558, Japan

#### EMERGENCY CONTACT :

Sumitomo Chemical Co.,Ltd.(Japan)  
TEL:+81-6-6466-5159,FAX:+81-6-6466-5474

### 2. COMPOSITION/INFORMATION ON INGREDIENTS

COMPONENT	CAS No.	%	OSHA PEL	ACGIH TLV
#Propylene glycol monomethyl ether acetate (PGMEA*)	108-65-6	ca.86~90 %	--	
Poly vinyl phenol derivatives	--	ca. 8~11 %	---	
Photoactive compound	---	ca. 2 %	---	
Crosslinking agent	---	ca. 0~1%	---	

# Hazardous with the meaning of 29 C.F.R.Part 1910.1200.

\*  $\beta$ -Isomer ( $\beta$ -PGMEA) is contained less than 1 %

### 3. HAZARDS IDENTIFICATION

**EMERGENCY OVERVIEW** :Flammable brownish viscous liquid. This material have not been fully investigated. Avoid inhaling vapor. Avoid contact with skin and eyes.

#### POTENTIAL HEALTH EFFECTS:

**INHALATION** :High vapor concentration may cause headache, drowsiness, dizziness, nausea, cough and irritation. Solvent can cause irritation.

**EYE CONTACT** :May cause irritation.

**SKIN CONTACT** :Prolonged or repeated contact may cause drying, cracking or irritation.

**INGESTION** :Solvent is harmful if swallowed.

**CHRONIC** :No known effects.

End of Page 1

MSDS continued on next page.(US)

Sumiresist NEB-31 series

Page: 2/7

**4. EMERGENCY AND FIRST AID MEASURES**

- INHALATION** :If exposure to vapor causes irritation or distress, remove subject to fresh air. Give oxygen or artificial respiration if needed. Get medical attention.
- SKIN CONTACT** :Immediately flush skin with soap and plenty of water. Remove clothing. Get medical attention. Wash clothing before reuse.
- EYE CONTACT** :Immediately flush eyes with plenty of water for at least 15 minutes, and contact a physician.
- INGESTION** :If swallowed, get medical attention. ( Or if swallowed, and the person is conscious, immediately give the person large quantities of water to dilute the chemical. Do not attempt to make the person vomit. Get medical attention immediately.)

**5. FIRE-FIGHTING MEASURES AND EXPLOSION HAZARD DATA**

- FLASH POINT** :48.5 °C ( Tag closed cup) (for PGMEA) (1)
- FLAMMABLE LIMITS** :Lower : 1.5vol% , Upper : 10vol% (for PGMEA) (1)
- AUTOIGNITION TEMPERATURE** :272 °C (for PGMEA) (1)
- EXTINGUISHING MEDIA** :Use carbon dioxide or dry chemical for small fires, alcohol resistant foam, universal foam or water spray for large fires.
- SPECIAL FIRE-FIGHTING PROCEDURES** : Fire fighters should be provided with normal protective equipment and positive-pressure self-contained breathing apparatus.
- UNUSUAL FIRE and EXPLOSION HAZARDS** : May form explosive air-vapor mixtures. There is a possibility of pressure building up in closed containers when heated. Water spray may be used to cool the container.
- HAZARDOUS DECOMPOSITION PRODUCTS** :May generate SO<sub>x</sub>, NO<sub>x</sub> or CO when heated to burning.

**6. ACCIDENTAL RELEASE MEASURES**

- GENERAL** : Eliminate all ignition source. Consult an expert on the disposal of recovered material. Ensure disposal is in compliance with government requirements and ensure conformity of local disposal regulations. Notify the appropriate authorities immediately. Take all additional action necessary to prevent and remedy the adverse effects of the spill.
- LAND SPILL** : Absorb it with commercially available absorbing materials.

End of Page 2

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Sumiresist NEB-31 series

Page: 3/7

**7. HANDLING AND STORAGE**

**PRECAUTIONS :** Avoid contact with eyes and skin. Use with adequate ventilation. Store out of light and keep in a cool dry area ( below 70° F / 20° C). Open bottle closure carefully to relieve possible internal pressure. Keep away from heat, spark and flame. Keep off alkaline materials. Do not exceed 98 kPa ( 1 kg/cm<sup>2</sup> ) for pressurizing bottles.

**8. EXPOSURE CONTROLS AND PERSONAL PROTECTION**

**ENGINEERING CONTROLS (VENTILATION) :** Use local ventilation at places where vapor can be released into the workplace air. Keep vapor concentrations below the recommended TLV.

ACGIH TLV for " Propylene glycol monomethyl ether acetate "(PGMEA) : Not established  
 OSHA PEL for " Propylene glycol monomethyl ether acetate "(PGMEA) : Not established

ACGIH TLV for " Propylene glycol methyl ether "(PGME) :100 ppm (369 mg/m<sup>3</sup>) [TWA] (2)  
 150 ppm (553 mg/m<sup>3</sup>) [STEL] (2)  
 OSHA PEL for " Propylene glycol methyl ether "(PGME) :100 ppm (360 mg/m<sup>3</sup>) [TWA] (3)  
 150 ppm (540 mg/m<sup>3</sup>) [STEL] (3)

**PERSONAL PROTECTION**

**RESPIRATORY** : Not required for occasional handling if adequate ventilation is available. A respirator is recommended for prolonged handling or exposure.

**PROTECTIVE GLOVES** : Wear chemical resistant gloves.

**EYE PROTECTION** : Wear safety goggles or equivalent eye protection.

**OTHER** : Wear appropriate protective clothing to prevent skin contact.

**WORK/HYGIENIC PRACTICES :** Always clean protective equipment and workplace.

**9. PHYSICAL AND CHEMICAL PROPERTIES**

**APPEARANCE** : Brownish viscous liquid      **ODOR** : Ester odor

**VAPOR PRESSURE** :510Pa( 3.8 mmHg) (25° C) (for PGMEA) (1)

**VAPOR DENSITY** : 4.6 (Air=1) (for PGMEA ) (1)

**BOILING POINT** : 146 ° C (for PGMEA) (1)

**MELTING POINT** : < - 55 ° C (for PGMEA) (1)      **SPECIFIC GRAVITY** : ca. 1

**SOLUBILITY in water** : Insoluble      **PERCENT VOLATILE** :Not known

**EVAPORATION RATE** : Not known

End of Page 3

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**10. STABILITY AND REACTIVITY**

STABILITY	: Stable in cool and dry area. Stable in intercepting light area.
HAZARDOUS POLYMERIZATION	: Will not occur.
CONDITIONS TO AVOID	: Exposure to the light.
INCOMPATIBILITY	: Oxidizing materials
HAZARDOUS DECOMPOSITION PRODUCTS	: See section 5

**11. TOXICOLOGICAL INFORMATION**

- 1. Product No data available.

- 2. Solvent ( PGMEA \* / PGME \*\* )

PGMEA \* :Propylene glycol monomethyl ether acetate  
 [Components of PGMEA] :1-Methoxypropyl-2-acetate [  $\alpha$ -PGMEA ] ( $\geq 99\%$  )  
 2-Methoxypropyl-1-acetate [  $\beta$ -PGMEA ] ( $< 1\%$  )

PGME \*\* :Propylene glycol monomethyl ether.  
 [Components of PGME] :1-Methoxypropyl-2-ol [  $\alpha$ -PGME ]  
 2-Methoxypropyl-1-ol [  $\beta$ -PGME ]

PGME is the parent glycol ester of PGMEA.

**EFFECTS ON HUMAN**

The effect of the central nervous system depression is clearly observed in humans exposed to 1,000 ppm or greater for short periods of time. (4)

Human volunteers exposed to up to 1,000 ppm of PGME have experienced eye, nose, and throat irritation. (4)

**EFFECTS ON EXPERIMENTAL ANIMALS****EYE EFFECT ( PGMEA ) :**

PGMEA cause eye irritation and redness. (5)

Undiluted PGMEA caused conjunctival redness in rabbits, slight conjunctival swelling, slight iritis and corneal opacity. The eye returned to normal within 7 days. (6)

**SKIN EFFECT:**

PGMEA cause skin drying and redness. (5)

Undiluted PGMEA was not irritating to the rabbit skin. (6)

Non sensitizing in guinea pigs ( 10% aqueous solution, modified Maguire test ). (6)

**ACUTE EFFECTS :**

The oral LD<sub>50</sub> of PGMEA in rats is 8,532 mg/kg. (6)

The oral LD<sub>50</sub> of PGME in rats is 5,660 mg/kg. (4)

The oral LD<sub>50</sub> of PGME in rabbits is 8,000 mg/kg. (4)

The dermal LD<sub>50</sub> of PGMEA in rabbits is  $> 5,000$  mg/kg. (6)

The dermal LD<sub>50</sub> of PGME in rabbits is 13,000 mg/kg. (4)

The inhalation LC<sub>50</sub> of PGMEA in rats is  $> 4,345$  ppm / 6H and no signs of toxicity were seen during exposure or upon gross pathological examination. (6)

The inhalation LC<sub>10</sub> of PGME in rats is 7,000 ppm / 4H and 15,000 ppm / 7H. (4)

The  $\beta$ -PGME, which is present in technical grade PGME, has an identical oral toxicity and only slightly higher, yet still unremarkable, dermal toxicity ( 5,660 mg/kg as a dermal LD<sub>50</sub> ). (4)

The main effect of brief exposures to high doses of PGME is depression of the central nervous system ; This effect is clearly observed in laboratory animals exposed to PGME at 3,000 ppm or more or to  $\beta$ -PGME at 550 ppm or more. (4)

**11. TOXICOLOGICAL INFORMATION (continued)****SUBACUTE EFFECTS:**

In the study, in which rats and mice were exposed to 0, 300, 1,000, or 3,000 ppm of PGMEA for 6hr / day for 9 days over two-week period, mild systemic toxic effects were observed. Specifically, increased liver weights and slight effects on kidney function were observed in the high-dose rats. In the most of the exposed rats in the 3,000 group, the occurrence of moderate degeneration of nasal mucous membrane was observed. And the treated mice displayed the same effect at all dose levels tested, with extent and severity being dose-dependent. (4)

In an hematological study, PGME administered to rats for 9 days at 6 hours / day at up to 3,000 ppm did not induce effects on the bone marrow or circulating red blood cells. (4)

**CHRONIC EFFECTS / CARCINOGENICITY :**

No data available. Not listed by IARC, NTP or OSHA.

**GENOTOXICITY :**

The Salmonella-Ames test, with and without metabolic active was negative. (6)

The unscheduled DNA synthesis test with rat hepatocytes was also negative. (6)

**REPRODUCTIVE / DEVELOPMENTAL EFFECTS :****Male reproductive effects :**

In the studys, in which rats were exposed for two weeks at up to 3,000 ppm of PGME containing either 4 or 18 percent  $\beta$ -PGME, rabbits were exposed for 13 weeks at up to 3,000 ppm of PGME containing 1.8 percent  $\beta$ -PGME and rats were exposed to up to 600 ppm of technical grade PGME of unspecified purity for 6 hours / day for 10 consecutive days, no adversed male reproductive effects were observed. Based on these studies, a NOAEL for male reproductive effects of 3,000 ppm can be established. (4)

**Female reproductive effects:**

In the study, in which rats were exposed to 2,700 ppm  $\beta$ -PGMEA of 95% purity via inhalation for 6 hours / day for Days 6 through 15 of gestation, the reductions in the number of live fetuses and increases in percentage of dead implantations were reported.

Pregnant rats exposed at 2,700 ppm and at 550 ppm exhibited maternal toxicity, as evidenced by decreased body weight gain. Based on this study, a NOAEL of 110 ppm for female reproductive effects can be established for  $\beta$ -PGMEA. (4)

In an inhalation study, technical grade PGME of unspecified purity did not reduce the number of live pups per litter in rats up to and including the highest dose tested ( 600 ppm x 6 hours / day ) on Days 6 through 17 of gestation ; based on this study, a NOAEL of 600 ppm can be established for technical grade PGME for female reproductive effects. (4)

In the inhalation study, in which pregnant female rats were exposed for 6 hours / day during Days 6 through 15 of pregnancy to 0, 500, 2,000 and 4,000 ppm of PGMEA, dyspnoea and reductions in food consumption and body weight were observed in 4,000 and 2,000 ppm group. In 500 ppm group, no signs of toxicity were observed. (6)

**Developmental Toxicity :**

In the study, in which rats were exposed to 2,700 ppm of  $\beta$ -PGMEA of 95% percent purity for 6 hours per day during Days 6 through 15 of gestation, skeletal anomalies were observed.

In this same study, rabbits exposed to 550 ppm for 6 hours per day during Days 6 through 18 of gestation demonstrated a high incidence of severe malformations as defects of the digits, heart, and sternum. Based on this study, a NOAEL of 145 ppm ( representing a 6 hours / day, 13-days exposure ) can be established for  $\beta$ -PGMEA. (4)

Sumiresist NEB-31 series

Page: 6/7

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**11. TOXICOLOGICAL INFORMATION (continued)****Developmental Toxicity :**

The study in which rats and rabbits were exposed to up to 3,000 ppm of PGME containing only 1.3 percent  $\beta$ -PGME demonstrated no teratogenic effects, no developmental toxicity and no reproductive effects ( e.g., no reduction in the number of live fetuses per litter ) in either species. (4)

In the inhalation study, in which pregnant female rats were exposed for 6 hours / day during Days 6 through 15 of pregnancy to 0, 500, 2,000 and 4,000 ppm of PGMEA, no teratological or other developmental effects were seen in foetuses in any of the dose levels . (6)

The potential for reproductive and developmental toxicity for PGMEA appears to be proportional to the content of  $\beta$ -PGMEA. No definitive statement regarding the potential developmental or teratogenic activity of PGMEA containing 5 percent (the maximum expected in technical grade PGMEA) can be made. (4)

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**12. ECOLOGICAL INFORMATION**

- 1. Product : No data available.

- 2. Solvent ( PGMEA ) :

COD : 475 mg/L ( Test sample concentration is 1,000 mg/L ) (1)

BOD : 412 mg/L ( Test sample concentration is 1,000 mg/L ) (1)

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**13. DISPOSAL CONSIDERATIONS**

To be incinerated by adequate method. Dispose in accordance with federal, state and local regulations. The owner of the materials responsible for proper waste disposal.

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**14. TRANSPORT INFORMATION**

Proper Shipping Name : Resin solution, flammable

UN number : 1866

Hazard class : 3.3 Packaging Group : III

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**15. REGULATORY INFORMATION (not meant to be all inclusive)****TSCA (Toxic Substance Control Act) :**

Poly vinyl phenol derivatives and photoactive compound are approved for TSCA Commercial purposes under the terms of the Low Volume Exemption(40CFR 723.50). The other components are listed on TSCA.

CERCLA (Comprehensive Environmental Response Compensation, and Liability Act) : None

SARA TITLE III (Superfund Amendments and Reauthorization Act) :

311/312 Hazard Categories : Acute health and fire hazard

313 Reportable Ingredients : None

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End of Page 6

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Sumiresist NEB-31 seriesPage: 7/7**16. OTHER INFORMATION**

REVISION SUMMARY :Newly prepared on 10/May/1999 .

Revised due to amendment of contents in section 1 and 2 on 13/February/2001.

**REFERENCES :**

- (1) Technical information of Sumitomo Chemical Co., Ltd.
- (2) ACGIH ; Threshold Limit Values and Biological Exposure Indices for 1995-1996 (1995)
- (3) OSHA ; Federal Register, 54 (No.12), 2332-2983
- (4) Technical information of Technology Sciences Group Inc. ; Comparative Hazard Evaluation of Ethylene Glycol Monomethyl Ether Acetate (EGMEA), Ethylene Glycol Ethyl Ether Acetate (EGEEA), Propylene Glycol monomethyl Ether Acetate (PGMEA), and Methyl n-Amyl Ketone (MAK) (1993)
- (5) IPCS ; International Chemical Safety Cards (Japanese), The Chemical Daily Co., Ltd. (1992)
- (6) ECETOC ; The toxicology of Glycol Ethers and its Relevance to Man, Technical Report No.64 (1995)

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The information is believed to be accurate and represents the best information currently available to us. However, no guarantee or warranty of any kind, expressed or implied, is made with respect to the information contained herein.

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