

1254 Chestnut Street  
Newton, MA 02464-1418  
Tel: (617) 965-5511  
Fax: (617) 965-5818

**MATERIAL SAFETY DATA SHEET**

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31 January 2005

**SECTION 1. CHEMICAL IDENTIFICATION** -----

CHEMICAL NAME: Organic Polymer Solution  
TRADE NAME: PMGI SF Series Resists  
Positive Radiation Sensitive Resists  
PRODUCT #: See Table 1 – Section 9

**SECTION 2. COMPOSITION**-----

HAZARDOUS  
INGREDIENTS: Cyclopentanone (CAS: 120-92-3); 65-85%.  
Tetrahydrofurfuryl alcohol (CAS: 97-99-4); 10-15%

OTHER  
INGREDIENTS: Polyaliphatic imide copolymer (CAS: 102322-80-5); 1-25%  
Proprietary Surfactant, <1%

**SECTION 3. HAZARD DATA**-----

INFLAMMABILITY: Flammable liquid.  
SKIN CONTACT: Irritant.  
EYE CONTACT: Severe eye irritant.  
INGESTION: Harmful if ingested.  
INHALATION: Harmful if inhaled.  
MUTAGENICITY: Data not available.  
OTHER: Repeated or prolonged contact or exposure to vapors of tetrahydrofurfuryl alcohol may cause decreased male fertility.  
TARGET ORGANS: Eyes, Epidermis, Nervous System.

**SECTION 4. FIRST AID MEASURES**-----

INHALATION: Inhalation is not an expected route of exposure. If respiratory irritation or distress occurs remove victim to fresh air. Seek medical attention if respiratory irritation or distress continues.

INGESTION: If victim is conscious and alert, give 2-3 glasses of water to drink and induce vomiting by touching back of throat with a finger. Do not induce vomiting or give anything by mouth to an unconscious person. Seek immediate medical attention. Do not leave victim unattended. Vomiting may occur spontaneously. To prevent aspiration of swallowed product, lay victim on side with head lower than waist. If vomiting occurs and the victim is conscious, give water to further dilute the chemical.

SKIN CONTACT: In case of contact, immediately wash with plenty of soap and water for at least 5 minutes. Seek medical attention. Remove contaminated clothing and shoes. Clean contaminated clothing and shoes before re-use.

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EYE CONTACT: Hold eyelids open and flush with a steady, gentle stream of water for at least 15 minutes. Seek medical attention.

**SECTION 5. FIRE FIGHTING MEASURES**

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**EXTINGUISHING**

MEDIA: Dry chemical, carbon dioxide, alcohol foam, and universal foam.

**SPECIAL FIRE FIGHTING PRECAUTIONS:**

Firefighters should wear NIOSH/MSHA approved self-contained breathing apparatus and full protective clothing. Remove all ignition sources if it can be done safely.

**UNUSUAL FIRE OR EXPLOSION HAZARDS:**

Product will burn under fire conditions. Containers may explode (due to build-up of pressure) when exposed to extreme heat. Vapors may travel a considerable distance to a source of ignition and flash back along vapor trail.

**SECTION 6. ACCIDENTAL RELEASE PROCEDURES**

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**EVACUATION**

PROCEDURES & SAFETY: Wear appropriate protective gear for the situation. See Personal Protection information in Section 8.

**CLEANUP & DISPOSAL OF SPILL:**

Absorb with an inert absorbent. Sweep up and place in an appropriate closed container (see Section 7). Clean up residual material by washing area with water. Collect washings for disposal.

**ENVIRONMENTAL &**

REGULATORY REPORTING: Do not flush to drain. If required proper authorities should be notified.

**SECTION 7. STORAGE AND HANDLING PRECAUTIONS**

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STORAGE: Store in tightly closed container in a cool, dry, well-ventilated environment away from ignition sources. Recommended container materials are polyethylene or glass.

**HANDLING:**

Use only under yellow light.  
Keep away from heat, sparks, and flames.  
Use only with mechanical exhaust.  
Do not contact with skin, eyes, and clothing. Severe eye irritant.  
Avoid prolonged or repeated contact with skin.  
Do not breathe vapors or mist.  
Wash with soap and water after handling.  
Have safety shower and eye wash available.  
Store and transfer under a blanket of dry inert gas.

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**SECTION 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION**

**RESPIRATORY PROTECTION:** Under normal conditions, use of air-purifying (half-mask/full-face) respirator with cartridges/canisters approved for use against organic vapors, dust, mists and fumes is recommended.

**VENTILATION:** General area dilution/exhaust ventilation.

**SKIN PROTECTION:** Skin contact should be minimized through the use of gloves and suitable long-sleeved clothing.

**EYE PROTECTION:** Eye contact should be prevented through use of chemical safety glasses with side shields or splash proof goggles.

**SECTION 9. PHYSICAL AND CHEMICAL DATA**

**APPEARANCE:** Clear, colorless to yellow liquid  
**ODOR:** Slightly sweet  
**BOILING POINT:** 120-130 °C (248-266 °F)  
**SPECIFIC GRAVITY:** See Table 1 below  
**VAPOR PRESSURE:** 8.7 mm @ 20 °C (68 °F)  
**VAPOR DENSITY:** 2.3 (air=1)  
**H<sub>2</sub>O SOLUBILITY:** 10-15% @ 20 °C, by wt.  
**% VOLATILES:** See Table 1 below  
**EVAPORATION RATE:** 1 (BuAc=1)  
**FLASH POINT:** 30 °C (86 °F) TCC  
**AUTOIGNITION TEMP:** 282 °C (540 °F)  
**EXPLOSION LIMITS:** 1.3 lower  
 unk. upper

**Table 1**

Name	Product #	Specific Gravity	Volatiles (% by wt.)	VOC (g/L)
SF1	G113101	0.966	99	955
SF2	G113102	0.968	98	950
SF3	G113103	0.970	97	945
SF4	G113104	0.973	96	935
SF5	G113105	0.975	95	930
SF6	G113106	0.980	94	920
SF7	G113107	0.981	93	915
SF7.5	G113175	0.983	92.5	910
SF8	G113108	0.984	92	905
SF9	G113109	0.985	91	900
SF10	G113110	0.988	90	890
SF11	G113111	0.992	89	880
SF12	G113112	0.996	87.5	870
SF13	G113113	0.998	87	860
SF14	G113114	1.001	86	865
SF15	G113115	1.003	85	850

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Name	Product #	Specific Gravity	Volatiles (% by wt.)	VOC (g/L)
SF17	G113117	1.008	82.5	830
SF19	G113119	1.012	81	820
SF23	G113123	1.023	77	785

**SECTION 10. REACTIVITY DATA**

STABILITY: Stable  
 INCOMPATIBILITY: Strong Oxidizing Agents, Strong Bases, Strong Acids, Strong Reducing Agents, Iron, Hydrazine  
 HAZARDOUS POLYMERIZATION: May occur. Avoid extreme pH.  
 HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS: Oxides of carbon.

**SECTION 11. TOXICITY HAZARDS**

As cyclopentanone:

Acute Eye Irritation: eye irritation, 100mg, rabbit. Severely irritating.  
 Acute Skin Irritation: skin irritation, 500mg, rabbit. Mildly irritating.  
 Acute Dermal Toxicity: LD50 – lethal dose 50% of test species, >5000 mg/kg, rabbit.  
 Acute Respiratory Irritation: no test data found for product.  
 Acute Inhalation Toxicity: no test data found for product.  
 Acute Oral Toxicity: LD50 – lethal dose 50% of test species, 1180 mg/kg, rat.

As Tetrahydrofurfuryl alcohol:

<u>Acute Test</u>	<u>Value</u>	<u>Species</u>
Oral LD50	1600 mg/kg	Rat
Intraperitoneal LD50	400 mg/kg	Rat
Oral LD50	2300 mg/kg	Mouse
Intravenous LD50	725 mg/kg	Rabbit
Oral LD50	800 mg/kg	Guinea Pig
Dermal LD50	5 mg/kg	Guinea Pig
Intraperitoneal LD50	400 mg/kg	Guinea Pig

Subchronic exposures (oral, dermal and inhalation) at relatively high levels have demonstrated systemic toxicity, reproductive toxicity, and central nervous system depression in either rats, rabbits or dogs.

As Polyaliphatic imide copolymer:

No data available.

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**SECTION 12. ECOLOGICAL DATA**

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No data available at this time

**SECTION 13. DISPOSAL CONSIDERATIONS**

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Comply with applicable local, state or international regulations regarding the proper disposal of this material and/or containers.

**SECTION 14. TRANSPORTATION INFORMATION**

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HAZARD CLASSIFICATION: Flammable Liquid  
SHIPPING NAME: Resin Solution  
UN NUMBER: UN 1866  
PACKING GROUP III

**SECTION 15. REGULATORY INFORMATION**

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**EUROPEAN INFORMATION**

**EINECS LISTED**

EC Nos: Cyclopentanone 204-435-9; Tetrahydrofurfuryl alcohol 202-625-6

**RISK & SAFETY PHRASES**

R10 Flammable  
R36/38 Irritating to eyes and skin  
S23.2 Do not breathe vapour  
S39 Wear eye/face protection

**INDICATIONS OF DANGER**

Xi Irritant

**US AND INTERNATIONAL INFORMATION**

HAZARDOUS LISTINGS: All ingredients appear on the TSCA Inventory of Chemical Substances and the Japan Hazardous Chemical Listing.

SARA Title III: This product IS NOT subject to SARA Title III, Section 313 Reporting Requirements.

Calif. SCAQMD Rule 443.1 VOC's: See Table 1 – Section 9

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SECTION 16. ADDITIONAL PRECAUTIONS AND COMMENTS

National Fire Protection Association Hazard Ratings – NFPA:

- 2 Health Hazard Rating
- 3 Flammability Rating
- 0 Reactivity Rating

To the best of our knowledge, the above information is believed to be accurate but does not claim to be all-inclusive and is intended to be used only as a guide. The supplier makes no warranty of any kind, expressed or implied, concerning the use of this product and shall not be held liable for any damage resulting from handling or from contact with the above product. User assumes all risks incident to its use.

MSDS Revision Information:

- A) Removed “NANO” name from trade name.