

Material Safety Data Sheet



PAE[®] Etchants

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: PAE[®] Etchants (various grades)

OTHER/GENERIC NAMES: Aqueous blends of phosphoric acid, nitric acid and acetic acid (some blends).

PRODUCT USE: Semi-conductor etching.

MANUFACTURER: General Chemical Corporation
90 East Halsey Road
Parsippany, NJ 07054

FOR MORE INFORMATION CALL: 973-515-1840
(Monday-Friday, 9:00am-4:30pm)

IN CASE OF EMERGENCY CALL: 800-631-8050
(24 Hours/Day, 7 Days/Week)

2. COMPOSITION/INFORMATION ON INGREDIENTS

<u>INGREDIENT NAME</u>	<u>CAS NUMBER</u>	<u>WEIGHT %</u>
Phosphoric acid	7664-38-2	70-80
Acetic acid	64-19-7	0-12
Nitric acid	7697-37-2	1-6
Water	7732-18-5	Balance

Trace impurities and additional material names not listed above may also appear in Section 15 towards the end of the MSDS. These materials may be listed for local "Right-To-Know" compliance and for other reasons.

OSHA Hazard Communication Standard: *This product is considered hazardous under the OSHA Hazard Communication Standard.*

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: A clear liquid with a pungent odor. Causes severe burns to skin and eyes and may cause blindness. May be fatal if inhaled or swallowed. Not flammable.

POTENTIAL HEALTH HAZARDS

SKIN: Causes severe skin burns. Severity of injury will depend on quantity and concentration of the liquid, duration of contact, and promptness in rendering first aid.

EYES: Causes severe eye burns which may result in blindness. Mist may cause severe eye irritation.

INHALATION: Extremely irritating to the nose, throat and respiratory tract. Symptoms may be delayed. Extended exposure or exposure to high concentrations can cause pulmonary edema, which may be fatal.

INGESTION: Corrosive to the mouth, throat and digestive tract. Complications can include possible difficulty with breathing, severe stomach pain, circulatory shock, and loss of consciousness. May be fatal.

MATERIAL SAFETY DATA SHEET PAE[®] Etchants

DELAYED EFFECTS: Repeated exposure to high levels of mist or fumes may cause chronic bronchitis and pitting of tooth enamel.

Ingredients found on one of the three OSHA designated carcinogen lists are listed below.

<u>INGREDIENT NAME</u>	<u>NTP STATUS</u>	<u>IARC STATUS</u>	<u>OSHA LIST</u>
No ingredients listed in this section.			

4. FIRST AID MEASURES

SKIN: Immediately flush with running water for 15 minutes. Remove contaminated clothing while flushing. Get immediate medical assistance.

EYES: Immediately flush with running water for 15 minutes. Get immediate medical assistance.

INHALATION: Remove to fresh air. Apply artificial respiration if not breathing. Get immediate medical assistance for any symptoms. Symptoms may be delayed.

INGESTION: If conscious, have victim drink a large amount of milk or water. **DO NOT INDUCE VOMITING.** If vomiting occurs, give more fluids, preferably milk, milk of magnesia (at least one ounce) or aluminum hydroxide gel (mixed with an equal amount of water). Do not give carbonates or bicarbonates because of gas release. Get immediate medical assistance.

ADVICE TO PHYSICIAN: Exposures to nitric acid vapors may result in delayed pulmonary edema. Treat inhalation exposures as chemical pneumonia.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT:	Not flammable 40C (acetic acid component)
FLASH POINT METHOD:	Closed cup
AUTOIGNITION TEMPERATURE:	426-465C (acetic acid component)
UPPER FLAME LIMIT (volume % in air):	16.0 (acetic acid component)
LOWER FLAME LIMIT (volume % in air):	5.4 (acetic acid component)
FLAME PROPAGATION RATE (solids):	Not applicable
OSHA FLAMMABILITY CLASS:	Not applicable

EXTINGUISHING MEDIA:

Use water spray, taking care to avoid spraying into containers.

UNUSUAL FIRE AND EXPLOSION HAZARDS:

Contact with common metals will generate hydrogen gas, a flammable, explosive and reactive hazard.

SPECIAL FIRE FIGHTING PRECAUTIONS/INSTRUCTIONS:

Firefighters should wear NIOSH-approved, self-contained breathing apparatus, full protective clothing and eye protection, as needed. Avoid splashing any spilled material on personnel. Use water spray to keep non-leaking, fire-exposed containers cool and to flush any spillage away from fire or contact with metals. Move containers from fire area if without risk.

MATERIAL SAFETY DATA SHEET

PAE[®] Etchants

6. ACCIDENTAL RELEASE MEASURES

IN CASE OF SPILL OR OTHER RELEASE: (See section 8 for recommended personal protective equipment.)

Flush with water immediately taking care not to splash personnel. Neutralize carefully with soda ash or lime and again flush with water. Provide ventilation to remove carbon dioxide resulting from neutralization and any nitrogen oxides present. Dike large spills with soda ash or sand and proceed cautiously with neutralization. Collect for disposal. Keep out of sewers.

Spills and releases may have to be reported to Federal and/or local authorities. See Section 15 regarding reporting requirements.

7. HANDLING AND STORAGE

NORMAL HANDLING: (See section 8 for recommended personal protective equipment.)

Do not breathe vapor or mist. Do not get in eyes, on skin or clothing. Keep containers tightly closed. Use only with adequate ventilation. Observe good housekeeping and personal hygiene practices. Wash thoroughly after handling.

STORAGE RECOMMENDATIONS:

Store away from heat and out of sunlight. Keep containers upright and protect from physical damage. To prevent possible ignition of any hydrogen gas that may form from accidental contact of metals with product, smoking, open flames and sparks must not be permitted in storage areas.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS:

All handling should be done in a closed ventilated system (e.g., exhausted hood). Equipment must be corrosion resistant.

PERSONAL PROTECTIVE EQUIPMENT

SKIN PROTECTION: Equipment should prevent any possibility of skin contact with the product. As a minimum for handling in a closed ventilation system, wear protective gloves (preferably neoprene or PVC; gauntlet-type preferred for heavy work) and a rubber apron. For spill, leak or other emergency add full protective clothing, including hat and boots. Remove and wash all clothing promptly upon contamination.

MATERIAL SAFETY DATA SHEET PAE[®] Etchants

EYE PROTECTION: At a minimum while working in a closed ventilation system, wear safety glasses with non-perforated side shields. Add a faceshield if pouring liquid. For spill or leak or other emergency, wear chemical safety goggles and faceshield. Do not wear contact lenses.

RESPIRATORY PROTECTION: For material handled normally in a closed ventilation system, none required. For leak or spill or other emergency, use self-contained breathing apparatus or supplied-air respirator.

ADDITIONAL RECOMMENDATIONS: Provide eyewash stations and quick-drench shower facilities convenient to the work area. Maintain neutralization equipment and supplies (e.g., absorbing materials) at sites of use and storage.

EXPOSURE GUIDELINES

<u>INGREDIENT NAME</u>	<u>ACGIH TLV</u>	<u>OSHA PEL</u>	<u>OTHER LIMIT</u>
Nitric acid	4 ppm STEL 2 ppm TWA	2 ppm TWA	-----
Phosphoric acid	3 mg/m ³ STEL 1 mg/m ³ TWA	1 mg/m ³ TWA	-----
Acetic acid	15 ppm STEL 10 ppm TWA	10 ppm TWA	-----

¹ = Limit established by General Chemical Corporation.

² = Workplace Environmental Exposure Level (AIHA).

³ = Biological Exposure Index (ACGIH).

OTHER EXPOSURE LIMITS FOR POTENTIAL DECOMPOSITION PRODUCTS:

None

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Clear liquid.
PHYSICAL STATE: Liquid
MOLECULAR WEIGHT: Mixture
CHEMICAL FORMULA: Mixture
ODOR: Pungent odor.
SPECIFIC GRAVITY (water = 1.0): ~ 1.5-1.6 (varies with composition)
SOLUBILITY IN WATER (weight %): 100
pH: Estimated <1
BOILING POINT: Approx. 261C (varies with composition)
MELTING POINT: Approx. -18C (varies with composition)
VAPOR PRESSURE: Estimated 6
VAPOR DENSITY (air = 1.0): 2.07 (acetic acid component)
EVAPORATION RATE: >1 **COMPARED TO:** Butyl acetate
% VOLATILES: 19-27 (varies with composition)
FLASH POINT: Not flammable
(Flash point method and additional flammability data are found in Section 5.)

MATERIAL SAFETY DATA SHEET
PAE[®] Etchants

10. STABILITY AND REACTIVITY

NORMALLY STABLE? (CONDITIONS TO AVOID):

Stable under normal conditions. Avoid high temperatures.

INCOMPATIBILITIES:

Most metals, metal oxides, alkalis, carbonates, sulfides and cyanides, water-reactive chemicals and strong oxidizing agents.

HAZARDOUS DECOMPOSITION PRODUCTS:

Nitrogen oxides and acid mists and/or vapors of nitric acid, acetic acid and carbon dioxide and carbon monoxide would be expected to be evolved in a fire.

HAZARDOUS POLYMERIZATION:

Will not occur

11. TOXICOLOGICAL INFORMATION

IMMEDIATE (ACUTE) EFFECTS:

Nitric acid component:

LD_{Lo} (oral-human): 430 mg/kg

Acetic acid component:

LD₅₀ (oral-rat): 3310 mg/kg

LC₅₀ (inhl-mouse): 5620 ppm/1 hr

Phosphoric acid component:

LD₅₀ (oral-rat): 1530 mg/kg

LD₅₀ (skin-rabbit): 2740 mg/kg

DELAYED (SUBCHRONIC AND CHRONIC) EFFECTS:

Nitric acid component:

Chronic exposure can produce changes in pulmonary function and/or chronic bronchitis.

OTHER DATA:

None

12. ECOLOGICAL INFORMATION

Nitric acid component:

72 ppm/96 hrs/mosquito fish/TL_m/freshwater

Acetic acid component:

75 ppm/96 hr/bluegill/TL_m/fresh water

100 ppm/96 hr/goldfish/TL_m/fresh water

100-330 ppm/48 hr/shrimp/LC₅₀/aerated water

Phosphoric acid component:

LC₅₀ (96 hr) mosquito fish: 138 mg/L

MATERIAL SAFETY DATA SHEET
PAE® Etchants

13. DISPOSAL CONSIDERATIONS

RCRA

Is the unused product a RCRA hazardous waste if discarded? Yes

If yes, the RCRA ID number is: D002 (corrosive)

OTHER DISPOSAL CONSIDERATIONS:

If permitted by regulations, material may be neutralized with alkali.

The information offered in section 13 is for the product as shipped. Use and/or alterations to the product such as mixing with other materials may significantly change the characteristics of the material and alter the RCRA classification and the proper disposal method.

14. TRANSPORT INFORMATION

US DOT HAZARD CLASS: 8
US DOT ID NUMBER: UN3264
PROPER SHIPPING NAME: Corrosive liquid, acidic, inorganic, N.O.S. (contains phosphoric acid, nitric acid, acetic acid)

For additional information on shipping regulations affecting this material, contact the information number found in Section 1.

15. REGULATORY INFORMATION

TOXIC SUBSTANCES CONTROL ACT (TSCA)

TSCA INVENTORY STATUS: All ingredients listed on the TSCA Inventory

OTHER TSCA ISSUES: None

SARA TITLE III/CERCLA

"Reportable Quantities" (RQs) and/or "Threshold Planning Quantities" (TPQs) exist for the following ingredients.

<u>INGREDIENT NAME</u>	<u>SARA/CERCLA RQ (lb)</u>	<u>SARA EHS TPQ (lb)</u>
Acetic acid	5000	-----
Nitric acid	1000	1000
Phosphoric acid	5000	-----

Spills or releases resulting in the loss of any ingredient at or above its RQ requires immediate notification to the National Response Center [(800) 424-8802] and to your Local Emergency Planning Committee.

SECTION 311 HAZARD CLASS: Immediate

SARA 313 TOXIC CHEMICALS:

MATERIAL SAFETY DATA SHEET
PAE[®] Etchants

The following ingredients are SARA 313 "Toxic Chemicals" and may be subject to annual reporting requirements. CAS numbers and weight percents are found in Section 2.

<u>INGREDIENT NAME</u>	<u>COMMENT</u>
Nitric acid	None
Phosphoric acid	None

STATE RIGHT-TO-KNOW

In addition to the ingredients found in Section 2, the following are listed for state right-to-know purposes.

<u>INGREDIENT NAME</u>	<u>WEIGHT %</u>	<u>COMMENT</u>
No ingredients listed in this section.		

ADDITIONAL REGULATORY INFORMATION:

None listed

WHMIS CLASSIFICATION (CANADA):

E, D2B. Classified in accordance with WHMIS Controlled Product regulations.

FOREIGN CHEMICAL CONTROL INVENTORY STATUS:

All ingredients listed on EINECS and Canadian DSL.

16. OTHER INFORMATION

CURRENT ISSUE DATE: May, 2001
PREVIOUS ISSUE DATE: October, 1986

CHANGES TO MSDS FROM PREVIOUS ISSUE DATE ARE DUE TO THE FOLLOWING:

Revised to ANSI format.

OTHER INFORMATION: None