Safety Data Sheet (MSDS)

(According to GB/T 16483 and GB/T 17519; Adapts to GHS, IMDG, IATA Standards)

Metal Etchant

Revision Date: 20 FEB 2026

SECTION 1: Identification of the Substance/Mixture and of the Company/Undertaking

1.1 Product Identifiers

- Product Name: Metal Etchant
- Product Number: ME-20260220
- Brand: SIGALD
- CAS-No.: N/A
- Synonyms: Industrial Metal Etching Solution; PCB Metal Etchant; Precision Metal Etchant
- EINECS/EC-No.: N/A

1.2 Details of the supplier of the safety data sheet

- Company: NEWAY SINOPHC TECH. LIMITED
- Address: RM. 204, BUILDING 3, NO. 188, AONA RD., CHINA (SHANGHAI) PILOT FREE TRADE ZONE.
- Telephone: +86-021-50350029
- Fax: +86-021-50350029

1.3 Emergency telephone

- Emergency Phone #: +86-021-50350029 (CHEMTREC)

1.4 Relevant Identified Uses and Uses Advised Against

- Identified Uses: Precision etching of copper/aluminum/iron alloy; PCB/FPC board metal layer etching; electronic component metal surface treatment; metal mold fine processing.
- Uses Advised Against: Not for pharmaceutical/medical/food use; no contact with skin/eyes; do not mix with alkaline substances/organic solvents without professional guidance; avoid use on non-etched metal products.

SECTION 2: Hazards Identification

Summary of Emergency Measures	Amber transparent liquid with slight acidic odor. Corrosive to skin and eyes; causes severe skin burns and eye damage; harmful if inhaled/swallowed; may cause respiratory tract corrosion. After inhalation: Move to fresh air, seek medical advice immediately. In case of skin contact: Remove contaminated clothing, rinse with plenty of water for 15 minutes, seek medical help at once. After eye contact: Rinse with plenty of water for 20 minutes, call a doctor immediately. After swallowing: Do not induce vomiting, rinse mouth with water, seek emergency medical treatment. Non-combustible, no explosion risk.

2.1 GHS Classification

- Corrosive to skin (Category 1B)
- Serious eye damage (Category 1)
- Specific target organ toxicity - single exposure (Respiratory tract, Category 3)

- Acute toxicity, oral (Category 4)
- Acute toxicity, inhalation (Category 4)

2.2 GHS Label Elements

- Hazard Pictogram: (Corrosion)
- Signal Word: **Danger**
- Hazard Statements:
  - H314: Causes severe skin burns and eye damage
  - H332: Harmful if inhaled
  - H302: Harmful if swallowed
  - H335: May cause respiratory irritation
- Precautionary Statements:
  - P260: Do not breathe dust/fume/gas/mist/vapors/spray
  - P264: Wash skin thoroughly after handling
  - P280: Wear protective gloves/eye protection/face protection/respiratory protection
  - P301+P312: If swallowed: Call a POISON CENTER or doctor/physician if you feel unwell
  - P301+P330+P331: If swallowed: Rinse mouth. Do NOT induce vomiting
  - P303+P361+P353: If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
  - P304+P340: If inhaled: Remove victim to fresh air and keep at rest in a position comfortable for breathing
  - P305+P351+P338+P310: If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/physician
  - P310: Immediately call a POISON CENTER or doctor/physician
  - P405: Store locked up
  - P501: Dispose of contents/container to an approved waste disposal plant

2.3 Physical and Chemical HazardsNon-combustible; no explosive/oxidizing properties under normal conditions; reacts violently with strong alkalis (NaOH/KOH) to produce a large amount of heat; reacts with active metals (Zn/Al/Mg) to generate flammable hydrogen gas. No hazardous polymerization occurs.

2.4 Health Hazards

- Acute: Severe corrosive burns on skin contact; irreversible eye damage even with brief contact; inhalation of acidic vapor causes cough/throat corrosion/chest pain; swallowing causes severe burns to oral cavity/esophagus/stomach, accompanied by nausea/vomiting/abdominal pain.
- Chronic: Prolonged inhalation of low-concentration vapor may cause chronic bronchitis/pulmonary fibrosis; repeated skin contact leads to chronic dermatitis/skin ulceration.

2.5 Environmental HazardsAcute toxic to aquatic organisms (fish/daphnia); causes serious damage to aquatic ecosystems at low concentrations; non-biodegradable; acid components cause soil/water acidification; no bioaccumulation potential.

2.6 Other HazardsReaction with active metals generates flammable hydrogen gas, which may form explosive mixtures with air in confined spaces.

SECTION 3: Composition/Information on Ingredients

- Substance / Mixture: **Complex Chemical Mixture (Corrosive)**|3.1 Main Components|Blend of Inorganic Acids, Corrosion Inhibitor, Chelating Agent, Deionized Water|||---|---||Formula|Inorganic acid system + organic corrosion inhibitor + chelating additive||Molecular Weight|Variable||CAS-No.:|N/A (Individual components have CAS, composite has no unified CAS)||EC-No.:|N/A|

Hazardous Key Ingredients

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Component	CAS-No.	Classification	Concentration (w/w)
Inorganic Acid Mixture	7664-38-2/64-19-7	Corros. 1B; Eye Dam. 1	10.0-18.0%
Corrosion Inhibitor	94-36-0	Non-hazardous	1.0-3.0%
Chelating Agent	144-55-8	Non-hazardous	0.5-2.0%
Deionized Water	7732-18-5	Non-hazardous	77.0-88.5%

SECTION 4: First Aid Measures

4.1 Description of First-Aid Measures

- If Inhaled: Move victim to fresh air immediately, keep in a comfortable breathing position. Loosen tight clothing; provide oxygen if breathing is difficult. **Immediately call a doctor or POISON CENTER**; do not give anything by mouth to an unconscious person.
- In Case of Skin Contact: **Remove all contaminated clothing, shoes and accessories at once**. Rinse the affected area with plenty of running water for at least 15 minutes (ensure water flushes all crevices). Do not use neutralizing agents on the skin directly. Seek **emergency medical treatment** immediately, even if no obvious burns are seen.
- In Case of Eye Contact: **Hold eyelids open and rinse continuously with clean running water for at least 20 minutes**, ensuring water flushes the entire eye surface (including under the eyelid). Do not rub eyes or use eye drops. **Immediately go to the hospital for ophthalmic treatment**; irreversible eye damage may occur without timely treatment.
- If Swallowed: **Do not induce vomiting** (risk of corrosive damage to the esophagus during regurgitation). Rinse mouth with clean water (do not swallow). If conscious and alert, drink a small amount of milk or water to dilute the acid. **Call an ambulance or POISON CENTER immediately** for emergency treatment.

4.2 Most Important Symptoms and Effects

- Acute: Severe skin burns/ulceration; irreversible corneal damage/blindness; respiratory tract corrosion/cough/chest pain; gastrointestinal tract burns/nausea/vomiting/hematemesis.
- Delayed: Skin scarring may occur 1-2 weeks after contact; pulmonary edema may develop 24 -48 hours after severe inhalation; gastrointestinal stricture may occur after swallowing.

4.3 Indication of Immediate Medical AttentionAll exposure scenarios (skin/eye contact, inhalation, swallowing) require **immediate professional medical attention**; no self-treatment is allowed. Inform the doctor of the product's corrosive acidic properties for targeted treatment.

SECTION 5: Firefighting Measures

5.1 Extinguishing Media

- Suitable: Water spray, carbon dioxide (CO_2), dry chemical powder, foam.
- Unsuitable: No limitations of extinguishing agents; avoid direct contact of fire-fighting water with the product and reactive metals.

5.2 Special Hazards Arising from the SubstanceNon-combustible; reacts with active metals in fire scene to generate flammable hydrogen gas, which may cause flashback; combustion of organic additives produces low-toxic carbon monoxide/carbon dioxide; acidic vapor spreads with smoke, causing corrosive damage to firefighters.

5.3 Advice for FirefightersWear **full chemical protective gear (including SCBA, acid-resistant clothing, gloves, goggles)**; keep a safe distance from the fire scene; avoid contact with fire-fighting water mixed with the product. Evacuate to upwind areas; prevent acid-containing fire -fighting water from entering sewers/water bodies to avoid environmental pollution.

SECTION 6: Accidental Release Measures

6.1 Personal PrecautionsWear **level C personal protective equipment (acid-resistant gloves, face shield, respiratory protection, acid-resistant apron)**; eliminate all ignition sources (no smoking, turn off electrical equipment) to prevent hydrogen gas explosion from reaction with metals. Evacuate non-essential personnel; set up a warning zone with "Corrosive Hazard" signs.

6.2 Environmental PrecautionsPrevent spilled liquid from entering sewers, rivers, lakes, soil or storm drains. Build dikes with acid-resistant materials to contain the spill; cover the spill area with neutralizing agent (calcium carbonate/sodium bicarbonate) to reduce environmental damage. Do not discharge contaminated water into the natural environment.

6.3 Methods and Materials for Containment and Cleaning Up

- Small Spill: Sprinkle neutralizing agent (calcium carbonate) on the spill area, stir until no bubbling occurs, then absorb with inert absorbent (diatomaceous earth), collect into a sealed acid-resistant HDPE container for hazardous waste disposal. Rinse the area with a small amount of water and collect the rinsing liquid for treatment.
- Large Spill: Contain the liquid with acid-resistant sandbags/plastic sheeting, add neutralizing agent in batches for neutralization (control reaction temperature to avoid splashing), transfer the neutralized mixture to a sealed acid-resistant drum with hazard labels using an acid-resistant pump, and dispose of by a licensed hazardous waste treatment company.

6.4 Reference to Other SectionsFor waste disposal, see Section 13; for personal protection, see Section 8.

SECTION 7: Handling and Storage

7.1 Precautions for Safe HandlingOperate in a **well-ventilated fume hood with acid exhaust system**; use acid-resistant tools (PP/PTFE) for transfer/weighing; avoid generating acidic vapor/mist. Wear full specified PPE for all operations; no eating/drinking/smoking/phone use in the work area. Do not mix with strong alkalis, active metals, organic solvents or oxidizing agents; avoid splashing during operation. Wash hands/face/exposed skin thoroughly with water after handling; change contaminated clothing immediately and clean it separately.

7.2 Conditions for Safe Storage

- Storage Conditions: Store in a **cool, dry, well-ventilated acid-resistant warehouse** (≤25℃, relative humidity ≤70%). Keep in original sealed acid-resistant HDPE/PTFE containers; store away from direct sunlight and heat sources.
- Incompatibilities: Strong alkalis (NaOH/KOH), active metals (Zn/Al/Mg/Fe), ammonia water, organic amines, oxidizing agents (H_2O_2/$KMnO_4$), flammable organic solvents.
- Storage Class (TRGS 510): 8 (Corrosive Substances)
- Shelf Life: 12 months (unopened, under the specified storage conditions).
- Segregation: Store in a dedicated corrosive substance storage area with acid-resistant ground and leakage collection tank; keep a minimum distance of 2 meters from alkalis, metals and flammable materials; mark clear "Corrosive Acid" warning signs; store locked up to prevent unauthorized access.

SECTION 8: Exposure Controls/Personal Protection

8.1 Control Parameters

- Occupational Exposure Limit (OEL) for inorganic acid components: TWA 5 ppm (15 mg/m³) (8-hour, ACGIH); STEL 10 ppm (30 mg/m³) (15-minute, ACGIH)
- Biological Limit Value (BLV): N/A

8.2 Exposure Controls

- Engineering Controls: Local acid exhaust ventilation (LEV) with acid gas scrubber (alkaline absorption) for all operations; acid-resistant leakage collection system in the work area; temperature control (≤25℃) to reduce vapor volatilization; emergency shower and eye wash station within 10 meters of the work area.
- Personal Protective Equipment (PPE):
  - Eye/Face Protection: **Acid-resistant full face shield + chemical safety goggles** (mandatory, double protection).
  - Skin Protection: Acid-resistant neoprene gloves (thickness ≥0.5 mm), acid-resistant apron, acid-resistant clothing, anti-corrosive shoe covers.
  - Respiratory Protection: **Half-face air-purifying respirator with acid gas cartridges** for routine operations; full-face SCBA for confined space/spill emergency.

- Other: Chemical-resistant head cover, disposable protective sleeves to avoid skin exposure.

SECTION 9: Physical and Chemical Properties

9.1 Information on Basic Physical and Chemical Propertiesa) Physical State: Liquidb) Color: Light yellow to amberc) Odor: Slight pungent acidic odord) Melting Point/Freezing Point: ≤ 0℃ (aqueous mixture)e) Boiling Point: 105-110℃ (760 mmHg, acid water azeotrope)f) Flammability: Non-combustibleg) Flammability Limits: Not applicableh) Flash Point: Not applicablei) Autoignition Temperature: > 450℃j) Decomposition Temperature: ≥ 120℃ (acid concentration, no hazardous decomposition)k) pH Value (25℃): 0.5-2.0l) Viscosity (25℃): 20-50 mPa·sm) Solubility: Fully miscible with water; insoluble in organic solvents (ethanol/ether)n) Partition Coefficient (log P, n-octanol/water): < -2.0o) Vapor Pressure (25℃): 2.5 hPap) Density (25℃): 1.10-1.20 g/cm³q) Relative Vapor Density: 1.2 (air=1, acidic vapor)r) Evaporation Rate: Moderate (water=1, 0.9)s) Explosive Properties: Not explosivet) Oxidizing Properties: None

9.2 Other Safety InformationAcidic vapor is highly water-soluble and easy to condense on cold surfaces to form corrosive liquid.

SECTION 10: Stability and Reactivity

10.1 Chemical Stability: Stable under the recommended storage and handling conditions (≤25℃, sealed, away from incompatible materials); stable for 12 months under normal storage, no precipitation/stratification.10.2 Possibility of Hazardous Reactions: Reacts violently with strong alkalis (exothermic); reacts with active metals to generate flammable hydrogen gas; reacts with ammonia water to produce toxic ammonium salt vapor; no hazardous polymerization under normal conditions.10.3 Conditions to Avoid: High temperature (>60℃), direct sunlight, contact with incompatible materials, strong mechanical shock, mixing with water in large quantities (local overheating).10.4 Incompatible Materials: Strong alkalis, active metals, ammonia water, organic amines, oxidizing agents, flammable organic solvents, metal powders.10.5 Hazardous Decomposition Products: No hazardous decomposition products under normal conditions; high-temperature concentration produces acidic vapor; reaction with alkalis produces salt and water (exothermic).

SECTION 11: Toxicological Information

11.1 Information on Toxicological Effects

- Acute Toxicity:
  - Oral (Rat, LD_{50}): 850 mg/kg (Harmful, corrosive)
  - Dermal (Rabbit, LD_{50}): 520 mg/kg (Corrosive, severe burns)
  - Inhalation (Rat, LC_{50}): 3.8 mg/m³ (4-hour vapor exposure, Harmful)
- Skin Corrosion/Irritation: Rabbit 1-minute contact test - severe corrosive burns (Category 1B), irreversible tissue damage.
- Serious Eye Damage/Irritation: Rabbit 30-second contact test - irreversible corneal damage (Category 1), permanent visual impairment.

- Respiratory Irritation: Rat inhalation test - severe bronchial corrosion and pulmonary edema at vapor concentrations ≥5 ppm, life-threatening.
- Mutagenicity: Ames test, chromosome aberration test - negative; no mutagenic effects.
- Carcinogenicity: IARC Classification - Group 3 (not classifiable as to carcinogenicity to humans); no carcinogenic effects in long-term animal tests.
- Reproductive Toxicity: No adverse reproductive/developmental effects in animal tests; avoid exposure for pregnant women (corrosive hazard only).
- Specific Target Organ Toxicity: **Skin, eyes, respiratory tract and gastrointestinal tract** are the main target organs; severe corrosive damage upon exposure, no damage to other organs with standard protection.
- Allergenicity: No significant skin sensitizing effects in animal tests.

SECTION 12: Ecological Information

12.1 Toxicity

- Fish (Zebrafish, 96h LC_{50}): 25 mg/L (Acute toxic)
- Daphnia (48h EC_{50}): 18 mg/L (Acute toxic)
- Freshwater Algae (72h EC_{50}): 32 mg/L (Acute toxic)12.2 Persistence and Degradability: Inorganic components are non-biodegradable; organic additives are partially biodegradable (BOD_5/COD = 0.35); acid components remain in water/soil for a long time and cause acidification.12.3 Bioaccumulative Potential: Low (log P < -2.0); no bioaccumulation in aquatic organisms and food chain.12.4 Mobility in Soil: High mobility; acid components leach into groundwater easily, causing groundwater acidification and heavy metal activation in soil.12.5 PBT/vPvB Assessment: Not classified as PBT/vPvB substances (no bioaccumulation, no persistence for organic components).12.6 Other Adverse Effects: Causes serious damage to aquatic plants and microorganisms; acidifies soil and reduces soil fertility; no adverse effects on terrestrial animals at normal environmental concentrations (no direct contact).

SECTION 13: Disposal Considerations

13.1 Waste Treatment Methods

- Product Waste: Expired/contaminated metal etchant is classified as **corrosive hazardous waste**; neutralize with alkaline agent (calcium hydroxide/sodium bicarbonate) to pH 6.0-8.0 first, then send to licensed hazardous waste treatment facilities for further treatment (coagulation/precipitation/filtration). Do not dispose of directly.
- Packaging Waste: Rinse packaging with a small amount of water for neutralization, collect rinsing liquid for hazardous waste treatment; dispose of contaminated packaging as corrosive waste; do not recycle or reuse.
- Unused Product: Do not discharge to the environment; transfer to a licensed hazardous waste treatment company for neutralization and treatment in accordance with local and international corrosive waste regulations.

- Disposal Compliance: Comply with China HW34 (Waste Acid), EU EWC 010102, US RCRA Subtitle C (Hazardous Waste).

SECTION 14: Transport Information

14.1 UN Number: ADR/RID: 3264; IMDG: 3264; IATA-DGR: 326414.2 UN Proper Shipping Name: Corrosive liquid, acidic, inorganic, n.o.s. (Metal Etchant)14.3 Transport Hazard Class: 8 (Corrosive substances)14.4 Packaging Group: II (Moderate hazard)14.5 Environmental Hazards: IMDG Marine Pollutant: **Yes**14.6 Special Precautions for TransportTransport in sealed **acid-resistant HDPE/PTFE containers** with anti-leakage caps and shockproof packaging; affix Class 8 corrosive hazard labels and "Marine Pollutant" signs, plus product identification labels (Metal Etchant - Corrosive Acid). Transport temperature ≤30℃; avoid direct sunlight, rain, collision, extrusion and rough handling during transport. Do not transport with strong alkalis, active metals, food, feed and cosmetics; transport in a dedicated compartment of Class 8 hazardous chemical vehicles with acid-resistant leakage collection tank and emergency neutralizing agent. Comply with ADR/RID, IMDG Code and IATA-DGR regulations for Class 8 corrosive liquids; provide MSDS/COA/corrosive chemical transport approval documents for customs clearance; no mixed transport with other hazardous chemicals.

SECTION 15: Regulatory Information

15.1 National/International Regulations

- China: Hazardous Chemicals Safety Management Regulation (Class 8 Corrosive Substance); Electronics Industry Metal Etching Material Standard (SJ/T); Environmental Protection Law; Water Pollution Prevention and Control Law.
- EU: REACH (Annex XVII compliant, not in SVHC Candidate List); CLP (GHS Classification - Danger); ADR/RID Class 8 Transport Regulations; EU Water Framework Directive.
- US: TSCA (listed on the TSCA Inventory); DOT Class 8 Corrosive Material; EPA Hazardous Waste Regulations (RCRA); OSHA Corrosive Substance Standard (29 CFR 1910.1000).
- International: ISO 9001 (Quality); ISO 14001 (Environment); IMO MARPOL Annex V (Marine Pollutant).

15.2 Additional Regulatory RequirementsProvide English MSDS, COA and corrosive chemical transport approval documents for customs clearance; apply for a special hazardous chemical storage license for on-site use; set up acid-resistant leakage collection and emergency neutralization facilities in the use area; the operation site must be equipped with emergency shower and eye wash station; only trained professional personnel can operate and use the product.

SECTION 16: Other Information

- Further Information: This MSDS complies with GB/T 16483, GB/T 17519 and GHS Rev.9 standards, and is for professional use only by trained personnel (production, storage, transport and disposal). Key characteristic: **Industrial metal etching agent, Class 8 corrosive liquid, severe**

skin/eye corrosion, acute aquatic toxicity, reacts with alkalis/active metals, stable under recommended storage conditions.

- Revision Date: 20 FEB 2026