Safety Data Sheet (MSDS) - Phenol

According to: GB/T 16483, GB/T 17519, GHS Rev.9, IMDG, IATA**Product Name**: Phenol**CAS Number**: 108-95-2**Product Number**: PHE-20260228**Brand**: SIGALD**Revision Date**: 28 FEB 2026**Supplier**: NEWAY SINOPHC TECH. LIMITED**Address**: RM. 204, BUILDING 3, NO. 188, AONA RD., CHINA (SHANGHAI) PILOT FREE TRADE ZONE**Telephone/Fax**: +86-021-50350029**Emergency Telephone**: +86-021-50350029 (24h Hazardous Chemical Emergency Response)

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

1.1 Product Identifiers

- Product Name: Phenol
- CAS-No.: 108-95-2
- MDL No.: MFCD00002142
- Synonyms: Carbolic acid; Hydroxybenzene; Phenic acid
- Product Number: PHE-20260228

1.4 Relevant Identified Uses and Uses Advised Against

- **Identified Uses**: Chemical synthesis raw material; pharmaceutical intermediate; rubber antioxidant; industrial disinfection; laboratory analytical reagent.
- **Uses Advised Against**: Food additive; cosmetic raw material; direct medical human body disinfection; household daily use (unprofessional); use in children's products.

SECTION 2: Hazards Identification

2.1 GHS Classification

- Acute toxicity, oral (Category 3)
- Acute toxicity, dermal (Category 3)
- Acute toxicity, inhalation (Category 3)
- Skin corrosion/irritation (Category 1A)
- Serious eye damage/irritation (Category 1)
- Specific target organ toxicity - single exposure (respiratory tract, liver, kidney) (Category 2)
- Specific target organ toxicity - repeated exposure (liver, kidney) (Category 1)
- Aquatic toxicity, acute (Category 2)
- Aquatic toxicity, chronic (Category 2)

2.2 GHS Label Elements

- **Hazard Pictograms**: Corrosion ( ), Toxic ( ), Environmental hazard ( )
- **Signal Word**: **Danger**
- **Hazard Statements**:
  - H301: Toxic if swallowed
  - H311: Toxic in contact with skin
  - H331: Toxic if inhaled
  - H314: Causes severe skin burns and eye damage
  - H371: May cause damage to organs (respiratory tract, liver, kidney) through single exposure
  - H372: Causes damage to organs (liver, kidney) through prolonged or repeated exposure
  - H401: Toxic to aquatic life
  - H411: Toxic to aquatic life with long-lasting effects
- **Precautionary Statements**:
  - P260: Do not breathe dust/fume/gas/mist/vapors/spray
  - P264: Wash skin thoroughly after handling
  - P270: Do not eat, drink or smoke when using this product
  - P271: Use only outdoors or in a well-ventilated area
  - P273: Avoid release to the environment
  - P280: Wear protective gloves/eye protection/face protection/respiratory protection
  - P301+P310: If swallowed: Immediately call a POISON CENTER/doctor
  - P302+P352+P310: If on skin: Wash with plenty of water and soap. Immediately call a POISON CENTER/doctor
  - 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/doctor
  - P405: Store locked up
  - P501: Dispose of contents/container in accordance with local/national/international regulations

2.3-2.6 Hazards Summary

- **Physical/Chemical Hazards**: Combustible solid/liquid (melting at 41℃); vapor forms explosive mixture with air; corrosive to most metals (mild corrosion to carbon steel, severe to aluminum); decomposes at high temperature (>300℃) to produce toxic phenol vapor and carbon monoxide.
- **Health Hazards**: Severe corrosive to skin and eyes, causing burns, blistering and permanent damage; inhalation of vapor causes respiratory tract corrosion, cough and chest tightness; oral ingestion causes severe gastrointestinal corrosion, vomiting and organ damage; long-term exposure causes chronic liver and kidney damage.
- **Environmental Hazards**: Highly toxic to aquatic organisms (fish, daphnia); difficult to biodegrade in water, with long-lasting toxic effects; accumulates in aquatic food chain, causing secondary pollution.

SECTION 3: Composition/Information on Ingredients

- **Substance/Mixture**: Pure organic compound (100% w/w)
- **Active Ingredient**: Phenol (CAS:108-95-2) | Hazard classification: see Section 2
- **No other ingredients/additives**

SECTION 4: First Aid Measures

4.1 First-Aid Measures

- **Inhaled**: Immediately remove victim to fresh air, keep respiratory tract open; give oxygen if breathing is difficult. **Immediately call a poison center/doctor**; monitor respiratory and organ function, and provide symptomatic treatment (anti-inflammatory, anti-corrosion).
- **Skin Contact**: **THIS IS A MEDICAL EMERGENCY**. Immediately remove contaminated clothing and shoes (avoid tearing the skin); rinse the affected area with **plenty of running water and 5% dilute acetic acid solution** for 15~20 minutes. **Immediately call a poison center/doctor**; treat skin burns and prevent infection.
- **Eye Contact**: **THIS IS A MEDICAL EMERGENCY**. Immediately rinse eyes with **sterile normal saline or running water** for 20~30 minutes (lift upper and lower eyelids to rinse thoroughly); remove contact lenses if worn. **Immediately consult an ophthalmologist**; perform corneal protection and anti-corrosion treatment.
- **Swallowed**: Do not induce vomiting (to avoid secondary corrosion of esophagus); rinse mouth with water and drink a small amount of milk/egg white to protect gastric mucosa. **Immediately call a poison center/doctor**; conduct gastrointestinal lavage and organ protection treatment under medical supervision.

4.2 Most Important Symptoms

Acute: Severe skin burns, blistering, necrosis; eye corneal damage, blurred vision, even blindness; inhalation causes sore throat, cough, dyspnea; oral ingestion causes severe abdominal pain, vomiting, hematemesis, liver/kidney failure.Delayed: Chronic liver and kidney function damage; skin pigmentation and scarring; respiratory tract chronic inflammation; visual impairment (untreated eye contact).

4.3 Medical Attention

Inform the physician of the product name (Phenol) and CAS number; emphasize **severe corrosivity and systemic toxicity**; conduct liver/kidney function, blood routine and respiratory tract examination for all exposure cases; administer anti-corrosion, organ protection and symptomatic treatment in time.

SECTION 5: Firefighting Measures

5.1 Extinguishing Media

- **Suitable**: Dry powder, carbon dioxide (CO_2), foam; water spray (for cooling fire-exposed containers, avoid direct high-pressure water on molten phenol).
- **Unsuitable**: Direct high-pressure water (to prevent molten phenol from spreading and causing secondary corrosion and pollution).

5.2 Special Hazards

- Combustible (flash point 79℃); vapor forms explosive mixture with air (explosion limit 1.3~11.0% in air).
- Thermal decomposition at high temperature produces **toxic phenol vapor, carbon monoxide and aromatic hydrocarbons**; combustion fumes are corrosive and toxic, causing respiratory tract damage if inhaled.

- Corrosive to fire-fighting equipment (aluminum alloy, plastic parts); molten phenol causes severe corrosion to the ground and equipment.

5.3 Firefighter Advice

- Wear **self-contained breathing apparatus (SCBA)** and full anti-corrosive fire-fighting gear (including anti-corrosive clothing, gloves and goggles).
- Fight fire from upwind and a safe distance; cool fire-exposed containers with water spray until the fire is completely out.
- Prevent combustion wastewater from entering sewers and water bodies (avoid environmental pollution); collect fire debris as hazardous waste for treatment.

SECTION 6: Accidental Release Measures

6.1 Personal Precautions

- Wear **level C anti-corrosive and toxic PPE**: nitrile rubber anti-corrosive gloves, chemical splash goggles, full face shield, anti-corrosive protective clothing and organic vapor gas mask.
- Evacuate all non-essential personnel to a safe distance (at least 50 meters); set up a restricted warning zone with obvious hazard signs (corrosion, toxic, environmental hazard).
- Operate in a well-ventilated area; avoid breathing vapor and direct contact with the spilled material.

6.2 Environmental Precautions

- Immediately block the spilled area to prevent phenol from entering sewers, rivers, lakes, soil and groundwater.
- Use sand, diatomite or other inert absorbents to cover the spilled material (avoid flushing with water); place oil booms in water bodies if accidental leakage into water occurs to prevent diffusion.

6.3 Containment and Cleaning Up

- **Small Spill (solid/crystalline)**: Collect with anti-corrosive tools into a sealed anti-corrosive container; clean the spill area with dilute acetic acid solution (5%) and rinse with a small amount of water; collect the rinse water for hazardous waste treatment.
- **Large Spill (molten/liquid)**: Contain with anti-corrosive dikes; pump into a sealed anti-corrosive drum with an anti-corrosive pump; mark the drum with obvious hazard information (corrosive, toxic); dispose of by professional hazardous waste treatment enterprises.
- Do not reuse contaminated absorbents; do not discard the spilled material and waste into the environment or public drainage system.

SECTION 7: Handling and Storage

7.1 Safe Handling

- Operate only in a **well-ventilated fume hood** with anti-corrosive ground and emergency flushing (eye/body) equipment; no open operation in the workshop.
- Use closed feeding, mixing and transfer equipment to reduce vapor volatilization; avoid manual direct contact with solid/liquid phenol.
- Do not eat, drink or smoke during handling; wash hands, face and exposed skin thoroughly with soap and water for at least 10 minutes after operation.
- Avoid contact with strong oxidants, strong acids, strong bases and halogens; avoid high temperature and open fire during operation to prevent combustion and explosion.

7.2 Safe Storage

- **Storage Temperature**: 0 ~ 30℃, cool, dry and well-ventilated hazardous chemical warehouse; separate storage of corrosive and toxic substances.
- **Sealing Requirement**: Air-tight, moisture-proof and anti-volatilization sealing; fill the container with dry nitrogen for long-term storage to prevent oxidation and discoloration.
- **Incompatibilities**: Strong oxidants ($KMnO_4$, H_2O_2), strong acids (concentrated H_2SO_4, HCl), strong bases (NaOH, KOH), halogens (Cl_2, Br_2), organic amines, food and feed raw materials.
- **Storage Class**: Hazardous chemical (corrosive + toxic); **locked storage** with dedicated person management; the warehouse is equipped with anti-corrosive and fire-fighting equipment.
- **Shelf Life**: 12 months (unopened, under specified storage conditions); 3 months after opening (sealed, used up as soon as possible with strict record).

SECTION 8: Exposure Controls/Personal Protection

8.1 Occupational Exposure Limits

- **OEL (China)**: 5 mg/m³ (8h TWA); 10 mg/m³ (STEL)
- **OEL (US OSHA)**: 5 ppm (19 mg/m³) (8h TWA)

- **OEL (EU)**: 2 ppm (7.6 mg/m³) (8h TWA)
- Biological limit: Urinary phenol ≤ 10 mg/L (post-shift); regular liver/kidney function examination for operators.

8.2 Exposure Controls

- **Engineering Controls**: Closed operation system; local exhaust ventilation (air exchange rate ≥ 15 times/h); fume hood with organic vapor purification system; workshop air quality real-time monitoring.
- **Personal Protective Equipment (PPE)**: **MANDATORY FULL PROTECTION**
  - Eye/Face: Chemical splash goggles + full anti-corrosive face shield (no ordinary safety glasses allowed)
  - Skin: Nitrile rubber anti-corrosive gloves (thickness ≥0.2mm) + anti-corrosive protective clothing + anti-corrosive boots + protective sleeves
  - Respiratory: Organic vapor filter gas mask (for normal operation); SCBA (for emergency spills/leaks/fire)
  - Other: Disposable anti-corrosive apron, hairnet and mask; emergency eye wash and body shower equipment within 3 meters of the operation area.
- **Hygiene**: Dedicated changing room for anti-corrosive work clothes (separate from daily clothes); no food/drinks in the operation area; regular occupational health checkups (quarterly) including liver/kidney function, skin and respiratory tract examination.

SECTION 9: Physical and Chemical Properties

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Property	Value
Physical State	Colorless crystalline solid (25℃); liquid (≥41℃)
Odor	Characteristic pungent, sweet odor
Melting Point	40.5 ~ 42.5℃
Boiling Point	181 ~ 183℃
Flash Point	79℃ (Closed Cup)
Autoignition Temperature	715℃
Explosion Limits	1.3 ~ 11.0% (v/v in air)
Solubility	8.3 g/100mL in water (25℃); miscible with ethanol/ether/acetone/chloroform
pH Value	5.0 ~ 6.0 (1% aqueous solution, 25℃)
Density	1.071 g/cm³ (liquid, 42℃); 1.057 g/cm³ (solid, 20℃)
Vapor Pressure	0.4 mmHg (20℃); 10 mmHg (53℃)
Vapor Density	3.24 (air=1)
Refractive Index	1.5418 (n_{20} /D, liquid)
Viscosity	12.1 mPa·s (45℃, liquid)
Surface Tension	40.9 mN/m (40℃)
Decomposition Temperature	>300℃ (produces toxic vapor)
Flammability	Combustible solid/liquid
Corrosivity	Corrosive to aluminum, zinc, plastic; mild corrosion to carbon steel

SECTION 10: Stability and Reactivity

10.1 Chemical Stability

Stable under **recommended storage and handling conditions (0~30℃, sealed, dry)**; no obvious degradation and discoloration within the shelf life.

10.2-10.5 Reactivity Summary

- No hazardous reactions under normal closed operation conditions (excluding contact with incompatible materials).
- **Conditions to Avoid**: High temperature (>40℃), open fire, strong light, contact with incompatible materials, air exposure (oxidation discoloration), moisture absorption (deliquescence).
- **Incompatible Materials**: Strong oxidants, strong acids, strong bases, halogens, organic amines, metal powders (Al, Zn), peroxides.

- **Hazardous Decomposition Products**: Phenol vapor, carbon monoxide, carbon dioxide, aromatic hydrocarbons (at >300℃ or combustion); no polymerization under normal conditions.
- **Hazardous Reactions**: Reacts violently with strong oxidants ($KMnO_4$) to produce heat and toxic gas; reacts with halogens to produce corrosive halogenated phenol; molten phenol corrodes most metals and produces hydrogen gas (with active metals).

SECTION 11: Toxicological Information

11.1 Key Toxicological Data

- **Acute Toxicity**:
  - Oral (Rat, LD_{50}): 317 mg/kg bw
  - Dermal (Rabbit, LD_{50}): 630 mg/kg bw
  - Inhalation (Rat, LC_{50}, 4h): 19 mg/m³ (vapor)
- **Skin Corrosion/Irritation**: Category 1A (Rabbit, 1h exposure: severe burns, necrosis)
- **Eye Damage/Irritation**: Category 1 (Rabbit, 0.1mL exposure: severe corneal damage, irreversible)
- **Respiratory Sensitization**: No sensitizing effects
- **Carcinogenicity**: IARC Class 2B (Possibly carcinogenic to humans)
- **Reproductive Toxicity**: Teratogenic (rat/mouse tests: high doses cause fetal malformation and growth retardation); affects fertility (reduces sperm activity in male animals)
- **Target Organ Toxicity**: Liver, kidney, respiratory tract, skin, eyes; long-term exposure causes chronic liver and kidney fibrosis.
- **Genotoxicity**: Mild mutagenic effect (Ames test weakly positive); no clastogenic effect (chromosome aberration test negative).

11.2 Toxicity Summary

Phenol is a **highly corrosive and toxic aromatic compound**; the main toxic effects are severe skin and eye corrosion, respiratory tract irritation and systemic organ damage (liver, kidney) caused by inhalation/ingestion; long-term exposure leads to chronic organ damage and has potential carcinogenic risks. It has moderate acute oral/dermal toxicity and high acute inhalation toxicity; high doses have teratogenic and fertility-inhibiting effects; the toxic effects are irreversible in severe cases and may even cause death due to organ failure.

SECTION 12: Ecological Information

12.1 Ecotoxicity

- Fish (Zebrafish, LC_{50}, 96h): 12.5 mg/L
- Daphnia (EC_{50}, 48h): 8.2 mg/L
- Algae (Scenedesmus, EC_{50}, 72h): 15.6 mg/L
- Aquatic plants (Elodea, EC_{50}, 96h): 20.3 mg/L
- **Conclusion**: Highly toxic to aquatic organisms (especially invertebrates and fish); even low concentrations cause death and developmental inhibition of aquatic life.

12.2-12.7 Ecological Properties

- **Persistence/Degradability**: Poorly biodegradable (BOD_5/COD = 0.1~0.2) in aquatic environments; half-life in water is 20~30 days, and it is stable in natural water bodies for a long time.
- **Bioaccumulative Potential**: High (log Kow=1.46; bioaccumulation factor (BAF) = 1000~2000 in fish); accumulates in the aquatic food chain and causes secondary toxic effects to higher trophic organisms.
- **Mobility in Soil**: High mobility; easily leaches into groundwater through soil and pollutes groundwater sources; half-life in soil is 30~60 days.
- **PBT/vPvB**: Classified as PBT (Persistent, Bioaccumulative, Toxic) by EU REACH.
- **Other Adverse Effects**: Inhibits the growth of soil microorganisms and affects soil fertility; toxic to terrestrial plants (root corrosion); causes damage to the respiratory and digestive systems of terrestrial animals.

SECTION 13: Disposal Considerations

13.1 Waste Treatment

- **Product Waste**: Classified as **hazardous chemical waste (corrosive + toxic + PBT)**; dispose of only by **licensed hazardous waste treatment enterprises**. The recommended treatment method is **high-temperature incineration (≥1200℃)** with flue gas purification system (to remove phenol vapor and acidic gas).

- **Packaging Waste**: Rinse the packaging with dilute acetic acid solution (5%) and water for 3 times under ventilation conditions; collect the rinse water for hazardous waste treatment; the cleaned packaging is crushed and disposed of as hazardous waste (no recycling, no secondary use).
- **Spill Waste & Absorbents**: Collect all contaminated absorbents, soil and water into sealed anti-corrosive containers; dispose of as hazardous waste together with product waste.
- **Do not dispose of with household waste, general industrial waste or medical waste**; do not discharge into sewers, rivers, soil or groundwater (strictly prohibited by environmental protection laws).

13.2 Disposal Regulations

Comply with China's **Hazardous Waste Pollution Control Law**, **Water Pollution Prevention and Control Law** and EU **REACH/WEEE** regulations; strictly follow the national hazardous chemical waste disposal procedures with complete account records and double signature confirmation; the disposal process must be supervised by the environmental protection department.

SECTION 14: Transport Information

14.1-14.7 Transport Details

- **UN Number**: UN 1671
- **UN Proper Shipping Name**: Phenol, solid
- **Transport Hazard Class**: 6.1 (Toxic substances) + 8 (Corrosive substances)
- **Packaging Group**: I (Severe danger)
- **Marine Pollutant**: Yes (P)
- **Special Transport Requirements**:

1. Transport with **national hazardous chemical transport license**; the driver and escort have professional hazardous chemical transport qualification certificates and emergency treatment training.
2. Use anti-corrosive, air-tight and shockproof transport containers (carbon steel/HDPE anti-corrosive drum); mark obvious GHS hazard pictograms and information (corrosive, toxic, environmental hazard) on the package.
3. Transport temperature ≤30℃; avoid direct sunlight, high temperature, rain and collision during transport; the transport vehicle is equipped with anti-corrosive, fire-fighting and emergency spill treatment equipment (inert absorbents, dilute acetic acid solution, anti-corrosive tools).
4. No mixed transport with food, feed, flammable materials, oxidants, strong acids, strong bases and living things; the transport vehicle is a dedicated hazardous chemical vehicle with anti-corrosive lining.

- **International Transport**: Comply with IMDG (sea), IATA (air) and ADR (road) regulations for Class 6.1 + 8 hazardous substances; declare the toxic, corrosive and marine pollutant characteristics to the customs and transport department in advance; air transport is restricted (only for small batch reagent grade with special approval).

SECTION 15: Regulatory Information

15.1 National/International Regulations

- **China**:
  - Hazardous Chemical Safety Management Regulation (Class 6.1 toxic + Class 8 corrosive hazardous chemical)
  - Environmental Protection Law (strict restriction on environmental discharge and PBT substance management)
  - Occupational Disease Prevention and Control Law (strict occupational exposure limit and health monitoring)
  - Water Pollution Prevention and Control Law (prohibition of discharge into water bodies)
- **International**:
  - GHS Rev.9 (hazard classification: Category 3 acute toxicity, Category 1A skin corrosion, Category 1 eye damage)
  - REACH (EU): Listed in SVHC Candidate List; classified as PBT substance, restricted in use and discharge
  - TSCA (US): Listed on the TSCA Inventory; restricted use in food and cosmetic fields
  - IMDG/IATA/ADR: Class 6.1 + 8 hazardous substance, marine pollutant
  - IARC: Class 2B carcinogenic substance, occupational exposure limit required

15.2 Other Requirements

- Production/sale/use limited to **enterprises with hazardous chemical production/operation license**; individual use is strictly prohibited.
- Occupational operation requires professional hazardous chemical training and certification; operators must pass regular occupational health checkups, and those with liver/kidney function damage are prohibited from engaging in relevant work.
- The whole process (production, storage, transport, use, waste disposal) is subject to joint supervision by emergency management, environmental protection, market supervision and transportation departments; complete traceability account management is required with no missing records.

SECTION 16: Other Information

- **MSDS Validity**: This MSDS is valid for 3 years from the revision date (28 FEB 2026) unless the product quality or hazard information changes.
- **Disclaimer**: This MSDS is based on current scientific and technical knowledge and complies with national and international relevant standards; the supplier is not liable for any damage caused by improper use, non-compliance with safety precautions or unauthorized handling of the product.
- **Additional Information**: For more technical application data (synthesis reaction conditions, corrosion protection measures), contact the supplier's technical department (+86-021-50350029 ext. 831) (only for enterprises with hazardous chemical operation license).
- **Key Reminder**: This product is a **Class 6.1 toxic + Class 8 corrosive hazardous chemical with PBT characteristics and potential carcinogenic risks**, which is highly corrosive to human body and highly toxic to the environment; any illegal production/sale/use/transport/disposal will be subject to legal liability in accordance with national and international laws. Strict compliance with hazardous chemical management regulations and full personal protection are mandatory for all operations; accidental exposure must be treated as a medical emergency and seek professional medical help immediately.