



SASOL

# Product Stewardship Summary

Phenol

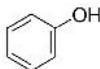
## Introduction:

Phenol is the simplest of a group of compounds containing an aromatic ring with a bonded OH group. It was first identified in the mid-1800s. Phenol is found in the environment in lignin, car exhaust, and cigarette and wood smoke. It is also a human metabolite, routinely found at low levels in urine. Phenol has been used as a disinfectant since the 19<sup>th</sup> century and has long been an important chemical building block. Commercial sourcing of phenol began with distillation of cresylic acids from coal tar and, later, extraction from petroleum refinery caustics. Today, our phenol is distilled from cresylic acids extracted from coal gasification processes. However, we play only a very small part in the global phenol market. Most phenol is produced by large-scale synthetic processes.

Our phenol is used predominantly by other chemical manufacturers and industrial users. Phenol is a key raw material in many manufacturing processes due to its unique reactivity and solvency properties. Although phenol is hazardous in nature, it is safely used in processes and products that benefit consumers. It is often the case that phenol is consumed entirely during use or reacted to become a nonhazardous substance. The typical American uses countless products which involve phenol somewhere in their manufacture.

## Chemical Identity:

- phenol (hydroxybenzene, CAS # 108-95-2)



## Uses:

Common uses for phenol, alone or in cresylic acid, are:

- Manufacture of resins and plastics for circuit boards, can coatings, laminates, plywood and other construction materials.
- Production of fuel and lubricant additives.
- Reactive solvent in applying insulation to magnet wire for transformers and electrical motors of all sizes found in cars, home appliances, and power tools.

- Solvents, oilfield chemicals, and disinfectants.
- Coloring agents, dyes, and pigments
- Fertilizers
- Foaming (blowing) agents
- Impregnation agents



## Description and Properties:

Phenol is a crystalline solid with a melting point of 41°C (106°F). It ranges in color from colorless/white to pink, yellow, amber, red or brown. Phenol is a weak organic acid which is partly miscible in water. It exhibits an antiseptic odor which is noticeable at concentrations below regulatory exposure limits. Phenol is not flammable but will burn. It is stable under recommended storage conditions.



**Health Information:**

The primary dangers posed in handling phenol are those resulting from physical exposure. Phenol is corrosive and contact with exposed skin or mucous membranes causes severe burns. Phenol also exhibits anesthetic properties. Therefore, victims may misjudge the extent of their exposure when the initial burning sensation subsides. This can result in prolonged contact, increasing further the toxic effects and corrosive damage.

Phenol is readily absorbed through the skin and mucous membranes in liquid or vapor form and acts as a systemic toxin. Relatively small areas of exposure (e.g. an arm or a hand) can allow sufficient absorption to cause severe poisoning. Progressive symptoms of such poisoning include headache, dizziness, ringing in the ears, nausea, vomiting, muscular twitching, mental confusion, loss of consciousness and possible death from lethal paralysis of the central nervous system. Chronic exposure can lead to loss of appetite, vomiting, nervous disorders, headaches, dizziness, fainting and dermatitis. Phenol is not listed as a carcinogen but is suspected of causing genetic defects.

**Health Effects Summary:**

| Effect Assessment                | Result  |
|----------------------------------|---|
| Acute Toxicity                   | Toxic if swallowed.<br>Toxic in contact with skin.<br>Toxic if inhaled.                         |
| Irritation / corrosion           | Corrosive: Causes severe skin burns and eye damage.   |
| Sensitization                    | Not considered to be sensitizing.   |
| Toxicity after repeated exposure | May cause damage to kidney, liver, skin, nervous system through prolonged or repeated exposure. |
| Genotoxicity / mutagenicity      | Suspected of causing genetic defects.   |
| Carcinogenicity                  | Available data indicated that classification is not warranted.                                  |
| Toxicity for reproduction        | Available data indicated that classification is not warranted.                                  |

**Environmental Information:**

Phenol is toxic towards both fish and aquatic invertebrates and care must be taken to prevent it from entering surface or ground waters. Phenol

tends to sink in fresh water but will float in concentrated brine. It is biodegradable in aerobic conditions. Soil or other materials contaminated with phenol may become hazardous and must be disposed of by trained personnel according to regulations. In case of fire, phenol vapors may form and be carried with smoke downwind, creating the possibility of exposure. Phenol has a low potential for bioaccumulation.

**Environmental Effects Summary:**

| Effect Assessment | Result   |
|-------------------|--|
| Aquatic Toxicity  | Toxic to aquatic life with long lasting effects. |

**Environmental Fate Summary:**

| Fate and Behavior         | Result   |
|---------------------------|--|
| Biodegradation            | Readily biodegradable.   |
| Bioaccumulation potential | Low potential for bioaccumulation.                             |
| Mobility                  | Not expected to adsorb on soil. The product evaporates slowly. |



**Exposure Potential:**

Because it is toxic and corrosive, phenol is regulated as a hazardous material. It is used primarily by other chemical manufacturers; therefore chemical and transportation workers have the highest risk of exposure. Our phenol is not sold for direct consumer use. However, downstream products containing it which consumers may encounter include carburetor cleaners, degreasers, paint strippers and disinfectants. Consumers should always consult product labels for hazard and safe handling information.

### Risk Management:

Phenol can be stored, transferred, processed and disposed of safely when proper procedures and safeguards are employed in industrial use. Phenol production is carried out in equipment designed to prevent exposure to workers and release to the environment. Tanks, piping, pumps, and other processing equipment are specified for handling of phenol. Secondary containment around storage tanks, process air combustion, scrubbers and other means are used to further protect from release to the environment. Access to the production facility is restricted to employees, and approved contractors and visitors.

Personal protective equipment such as chemical resistant suits, gloves and boots, goggles or face shields must be worn when handling or transferring phenol as dictated by the extent of potential exposure. Steel drums, tank trucks, railcars and other transport vessels are inspected prior to and after loading to ensure that no product is released. Carriers are approved and their performance reviewed. Sasol utilizes Chemtrec® and the National Chemical Emergency Centre (NCEC) as 24 hour contact numbers to provide emergency response information to transportation workers and first responders in the case of an accident en route.



Safety data sheets (SDS) for each product and practical safe handling information are provided to our customers and carriers so that they are able to use and transport our products safely. These documents include hazard information, chemical and physical properties, recommended storage conditions and personal protective equipment, firefighting and first aid information, accidental release measures, exposure guidelines and other regulatory information. Please refer to these documents for additional details.

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### Regulatory Information:

Phenol is classified as hazardous for workers and transport. It is regulated under a variety of local, state, federal and international laws requiring exposure and environmental controls, as well as various means of hazard communication such as labeling and SDS. Phenol has been registered under REACH (CE) 1907/2006.

#### Classification and labelling

Under GHS, substances are classified according to their physical, health, and environmental hazards. The hazards are communicated via specific labels and the safety data sheet. GHS attempts to standardize hazard communication so that the intended audience (workers, consumers, transport workers, and emergency responders) can better understand the hazards of the chemicals in use. The following classification and labelling information is based on the US Occupational Safety and Health Administration (OSHA) Hazard Communication Standard. Other regional classification and labelling information, such as substances registered for REACH in the European Union (EU), may differ from the US classification and labelling information.

#### Classification

- Flammable liquids Category 4
- Acute oral toxicity Category 3
- Acute dermal toxicity Category 3
- Acute inhalation toxicity Category 3
- Skin corrosion/irritation Category 1B
- Serious eye damage Category 1
- Germ cell mutagenicity Category 2
- Specific target organ systemic toxicity (repeated exposure) Category 2
- Acute aquatic toxicity Category 2
- Chronic aquatic toxicity category 2

#### Labelling

Signal word: Danger

Hazard pictograms:



Hazard statements:

- H227: Combustible liquid
- H301: Toxic if swallowed.
- H311: Toxic in contact with skin.
- H331: Toxic if inhaled.
- H314: Causes severe skin burns and eye damage.
- H318: Causes serious eye damage.
- H341: Suspected of causing genetic defects.
- H373: May cause damage to organs through prolonged or repeated exposure.
- H411: Toxic to aquatic life with long lasting effects.

Precautionary statements:

- P301 + P310 - IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician
- P301 + P330 + P331 - IF SWALLOWED: rinse mouth. Do NOT induce vomiting
- P260 - Do not breathe dust / fume / gas / mist / vapors / spray
- P304 + P340 - IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing
- P280 - Wear protective gloves/ protective clothing/ eye protection/ face protection
- P303 + P361 + P353 - IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower
- P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
- P310 - Immediately call a POISON CENTER or doctor/ physician
- P403 + P233 - Store in a well-ventilated place. Keep container tightly closed
- P210 - Keep away from heat/sparks/open flames/hot surfaces. - No smoking
- P370 + P378 - In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction
- P273 - Avoid release to the environment.

**Product Stewardship:**

Sasol is committed to the safe manufacture, handling and distribution of our products. We incorporate product stewardship into our operating and business decisions. We actively communicate our product stewardship expectations to new and existing customers and distributors. Our procedures require evaluation of potential customers with regard to the suitability of the proposed use and the safe handling systems in place prior to establishing a supply relationship. We conduct audits of customers, warehouses, and carriers as appropriate. We perform an annual product risk review, including all customers and shipping locations, to identify actions we can take to further minimize risk with regard to distribution and use of cresylic acids. Progress is tracked in implementing the identified actions. Results of this review are communicated throughout the organization so that employees are aware of the specific ways in which we meet our commitment to product stewardship and how they can support the effort.

We provide SDS and safe handling information to customers. We welcome questions and open communication with customers regarding practical handling and safety practices for our products. Our safety & health, operations, maintenance and technical service personnel are ready resources for customers and others involved in using or transporting our products.

**Conclusion:**

Phenol is an important chemical feedstock for products that consumers use every day at home, in travel, and in the workplace. It has a long history of helping make our lives more comfortable, safe, productive and healthy. Although phenol is a hazardous material, it is regulated for public safety and measures are in place for its safe manufacture, storage, distribution and use.

**For Further Information:**

|  |   |
|--|---|
| E-mail address                         | <a href="mailto:usasales@sasol.com">usasales@sasol.com</a>  |
| ICCA portal for additional information | <a href="http://www.icca-chem.org/en/Home/Global-Product-Strategy/">http://www.icca-chem.org/en/Home/Global-Product-Strategy/</a> |

**Glossary:**

|                  |  |   |  |
|------------------|--|---|--|
| Acute toxicity   | Harmful effect resulting from a single or short term exposure to a substance.                        | REACH                                     | REACH stands for Registration, Evaluation, Authorisation and Restriction of Chemicals. REACH is a regulation of the European Union, adopted to improve the protection of human health and the environment from the risks that can be posed by chemicals, while enhancing the competitiveness of the EU chemicals industry. |
| Biodegradation   | Decomposition or break-down of a substance under natural conditions (action of microorganisms etc.). |   |  |
| Bioaccumulation  | Progressive accumulation in living organisms of a chemical substance present in the environment.     |   |  |
| Carcinogenicity  | Substance effects causing cancer.  |   |  |
| Chronic toxicity | Harmful effect after repeated exposures or long term exposure to a substance.                        | Reprotoxicity                             | Including teratogenicity, embryotoxicity and harmful effects on fertility.   |
| Clastogenicity   | Substance effect that causes breaks in chromosomes.  | Sensitizing<br>Sediment                   | Allergenic<br>Topsoil, sand and minerals washed from land into water forming in the end a layer at the bottom of rivers and sea.   |
| Embryotoxicity   | Harmful effect on fetal health.  | Teratogenic                               | Substance effect on fetal morphology.  |
| Flash point      | The lowest temperature at which vapor of the substance may form an ignitable mixture with air.       | Vapor pressure                            | A measure of a substance's property to evaporate.  |
| Genotoxicity     | Substance effect that causes damage to genes, including mutagenicity and clastogenicity.             | Volatile                                  | Any substance that evaporates readily.   |
| GHS              | Global Harmonized System on Classification and Labelling of chemicals.                               |   |  |
| Hazard           | Inherent substance property bearing a threat to health or environment.                               | <b>Date of Issue:</b><br>October 20, 2016 |  |
| Mutagenicity     | Substance effect that cause mutation on genes.   | Revision: 3                               |  |
| Persistence      | Refers to the length of time a compound stays in the environment, once introduced.                   |   |  |

**References:**

Ullmann's Encyclopedia of Industrial Chemistry,  
Release 2003, 6<sup>th</sup> edition

Safe Handling of Cresols, Xylenols & Cresylic  
Acids, 2015

ASTM Method D 3852-99 – Standard Practice for  
Sampling and Handling Phenol, Cresols and  
Cresylic Acid

Product Safety Data Sheet

**Disclaimer:**

*This product stewardship summary is intended to give general information about the chemical or categories of chemicals addressed. It is not intended to provide an in-depth discussion of health and safety information. Additional information is available through the chemical's applicable Safety Data Sheet which should be consulted before use of the chemical. The product stewardship summary does not supplant or replace required regulatory and/or legal communication documents.*

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