

Phenol: Hazards and Precautions

Phenol can pose a severe health hazard and should be handled with extreme caution. Phenol is highly corrosive to the skin and readily absorbed through it, whereupon it can affect the central nervous system and cause damage to the liver and kidneys. It is also a mutagen, and there is some evidence that phenol may be a reproductive hazard.

When heated, phenol will produce flammable vapors that are highly toxic (at just a few parts per million) and explosive (at concentrations of 3% to 10% in air).

Phenol is a crystalline solid or a thick liquid with a sweet, tarry odor, and it ranges from colorless to pink in color. Synonyms for phenol include carbolic acid, benzophenol, and hydroxybenzene.

Health hazards

Acute effects:

Phenol is irritating and corrosive to the skin. Because it has a local anesthetic effect, little or no pain may be felt on initial contact. However, skin in contact with phenol will generally turn white; later, severe burns may develop. Phenol is rapidly absorbed through the skin, and toxic or even fatal amounts can be absorbed through relatively small areas. Ingestion of as little as 1 gram can be fatal to humans. Phenol can also cause severe damage to eyes. It could cause blindness.

Chronic effects:

Repeated or prolonged exposure to phenol or its vapors may cause headache, nausea, dizziness, difficulty swallowing, diarrhea, vomiting, shock, convulsions, or death. Phenol can affect the central nervous system, liver, and kidneys.

Special safety precautions

Good work practices can help reduce hazardous exposures.

- Whenever possible, work with phenol in a chemical fume hood, especially when heating it. Never heat or melt phenol in an incubator, microwave, drying oven, or similar appliance.
- Prevent phenol from contacting skin by wearing neoprene gloves and a laboratory coat. Change gloves frequently. Wear chemical goggles to protect the eyes.
- Review a phenol Material Safety Data Sheet (MSDS) before handling the material.
- Ensure that there is immediate and unobstructed access to an eyewash/shower unit in the work area.
- As with any chemical, do not eat, drink, or smoke where phenol is handled, processed, or stored, since the chemical could be ingested.
- Store phenol in a cool, dry, well-ventilated area, away from heated surfaces or ignition sources.
- Always wash hands thoroughly after handling phenol, even if gloves are used.

Emergency procedures

Skin contact with phenol requires immediate flushing of the contaminated area with soap and water at a sink or emergency shower for a good fifteen minutes. Remove contaminated clothing. In case of eye contact, promptly flush the eyes with copious amounts of water for 15 minutes (lifting upper and lower lids occasionally) and obtain medical attention. If phenol is ingested, obtain medical attention immediately. If large amounts of phenol are inhaled, move the person to fresh air and seek medical attention at once.

Spills of undiluted phenol should be considered serious and immediately cleaned up. If the spilled material is heated or is greater than 50 ml, remove ignition sources, provide adequate ventilation, evacuate the laboratory, close the doors, and call EHS at 642-3073. (After hours, contact EH&S via UCPD at 911.) Small liquid spills of 50 ml or less may be absorbed on paper toweling, vermiculite, or other absorbent material and placed in a sealed container or double plastic bags for proper disposal as hazardous waste. Be sure to wear gloves and other personal protective equipment when cleaning up small phenol spills.

Storage and waste issues

Phenol is a combustible acid. It must be stored so that it cannot come in contact with strong oxidizers (such as nitric acid and bromine) and strong bases (such as potassium hydroxide) because a violent reaction could result. Store below eye level to prevent injuries in case of a spill.

Phenol waste should be placed in a container that is clearly labeled and has a securely sealed lid. Complete a Materials Packing List (MPL) and send the indicated copies of the MPL to EH&S, or complete and submit an electronic MPL online at mpl.ehs.berkeley.edu. Call EH&S (642-3073) if you need MPL forms or have questions about the disposal of phenol waste. See the EH&S Fact Sheet "Unwanted Hazardous Chemicals" for general instructions on disposing of hazardous materials.

EH&S is available to train personnel on proper storage, handling, and cleanup procedures for phenol or to monitor air concentrations of phenol in a workspace. If you need assistance or if you have any questions regarding this Fact Sheet, please call EH&S at 642-3073.

