Phenol

Standard Operating Procedure

Revision Date: 10/30/23

Laboratory Director (LD) Approval is Required Prior to Performing this Procedure

This standard operating procedure (SOP) outlines the handling and use of phenol. Review this document and supply the information required in order to make it specific to your laboratory. In accordance with this document, laboratories should use appropriate controls, personal protective equipment, and disposal techniques when handling phenol. *All laboratory workers must read and understand the*[*Laboratory Emergencies SOP*](https://ehs.umich.edu/wp-content/uploads/2022/05/LaboratoryEmergencyProceduresSOP.docx)*prior to commencing any work in a laboratory.*

# Description [Provide additional information as it pertains to your research protocol]

Phenol is used as a reagent in chemical analysis. It causes burns and the risk of serious damage to the eyes. Phenol is toxic by inhalation, in contact with skin, and if swallowed.

## Process [Write the steps for using phenol in your research protocol]

# Potential Hazards [Provide additional information as it pertains to your research protocol]

* Phenol is very hazardous in case of skin contact – it is corrosive, toxic, and can cause irritation. Initially, it can cause numbness or slight tingling, so employees may not be immediately aware of contact. If absorbed through the skin it can cause muscle weakness, tremors, loss of coordination, shock, sudden collapse, coma, convulsions, organ damage, and death. It may cause severe eye injury (including blindness) if it contacts the eyes and is extremely toxic (fatal) by ingestion.
* Inhalation exposure is less likely – it does not evaporate easily at room temperature, but can be inhaled if heated and/or misted, or in the case of a large spill. If inhaled, phenol can cause upper respiratory irritation, lung damage, and CNS impairment.
* For more safety information, refer to Prudent Practice’s Laboratory Chemical Safety Summary for Phenol.(Prudent Practices in the Laboratory: Handling and Disposal of Chemicals, 1995)

## Occupational Exposure Limits (OELs):

* MIOSHA PEL and ACGIH TLV: **5 ppm**, 8-hour TWA

Contact EHS for assistance in performing an exposure assessment.

# Engineering Controls [Provide additional information as it pertains to your research protocol]

An eyewash (preferably an eyewash/drench hose combination unit) must be located in the immediate area. If medium-large quantities are used (>~100 ml of 100% phenol), a safety shower is also required. Contact Environment, Health & Safety (EHS) at (734) 647-1143 for an assessment of the need for a safety shower if one is not available. Work with large open containers should be performed only in a chemical fume hood. Small amounts can be handled safely on the bench top, as long as skin contact is avoided.

# Work Practice Controls [Provide additional information as it pertains to your research protocol]

* Designate areas where phenol is stored or manipulated.
* Since phenol is not readily soluble in cold water it is highly recommended that labs using phenol (or reagents containing phenol – e.g., TRIzol) have polyethylene glycol 300 or 400 (PEG-300 or PEG-400) on hand in case of dermal exposure. (PubChem Compound Summary for CID 996 Phenol, 2023)
* Purchase in the smallest container that is practical for lab use.
* Purchase in a shatter-resistant container if available (such as PVC-coated glass).
* Keep containers closed as much as possible.
* Use in the smallest quantities and lowest concentration practicable for the experiment being performed.
* After work with phenol is complete, wipe down the work area with soap and water solution.

# Personal Protective Equipment [Provide additional information as it pertains to your research protocol]

* Wear butyl, neoprene, or doubled nitrile laboratory gloves, safety glasses, and lab coat. If gloves are splashed, remove them immediately and put on a new pair of gloves. If splashes may occur, wear a face shield with chemical splash goggles, and an impervious apron over the lab coat.
* If phenol and chloroform will be used together, please note that chloroform easily penetrates nitrile gloves and can degrade them, allowing phenol to contact the skin. Plan work to avoid glove contact and change gloves immediately if there is a splash. If extensive work with phenol and chloroform is done in the lab, consider the reusable ChemTek Viton/Butyl glove made for work with both of these chemicals (or they can be used for spill clean-up).

# Transportation and Storage [Provide additional information as it pertains to your research protocol]

* Transport phenol in secondary containment, preferably polyethylene or other non-reactive acid/solvent bottle carrier.
* Keep the container in a cool, well-ventilated area.
* Keep the container tightly closed and sealed until ready for use.
* Store in secondary containment away from moisture, strong oxidizers, strong caustics, plastics, rubber, nitric acid, water + heat, and chemically active metals, such as aluminum and magnesium powder, sodium, potassium, and lithium.
* Store below eye level.
* Avoid storing on the floor.
* Avoid ignition sources.

# Waste Disposal [Provide additional information as it pertains to your research protocol]

Handle and store hazardous waste following the guidelines above for work practice controls, transportation, and storage.

Because most spent, unused, and expired chemicals/materials are considered hazardous wastes, they must be properly disposed of. **Do not dispose of chemical wastes by dumping them down a sink, flushing them in a toilet, or discarding them in regular trash containers, unless authorized by EHS Hazardous Materials Management (HMM)**. Contact EHS-HMM at (734) 763-4568 for waste containers, labels, manifests, waste collection, and for any questions regarding proper waste disposal. Also, refer to the EHS [Hazardous Waste](http://ehs.umich.edu/haz-waste/) Web page for more information.

# Training of Personnel

All personnel shall read and fully adhere to this SOP when handling acrylamide.

# References

Agency for Toxic Substances and Disease Registry. (2014, October 21). *Medical Management Guidelines for Phenol*. Retrieved 2023, from Toxic Substances Portal: https://wwwn.cdc.gov/TSP/MMG/MMGDetails.aspx?mmgid=144&toxid=27

Prudent Practices in the Laboratory: Handling and Disposal of Chemicals. (1995). Washington, DC: The National Academies Press. doi:10.17226/4911

*PubChem Compound Summary for CID 996 Phenol*. (2023). Retrieved from https://pubchem.ncbi.nlm.nih.gov/compound/996

# Certification

I have read and understand the above SOP. I have received approval from my Lab Director to perform this procedure. I agree to contact my Lab Director if I plan to modify this procedure.

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### Major Revisions (Tracking purposes only -- Do not print as part of SOP)

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| Date | Revision |
| 09-19-18 | Updated EHS name and logo and format and revised the Exposure/unintended contact section (AKJ) |
| 02-25-19 | Updated links and certification (DML) |
| 06-03-22 | Updated emergency response instructions and links (LGS) |
| 10-30-23 | Updated links (RSH) |