

STANDARD OPERATING PROCEDURES: Phenol (including TRIzol and other mixtures with Phenol)

Department:	
Principal Investigator(s):	
Laboratory Manager/Supervisor (or designated laboratory-specific chemical hygiene officer):	
Laboratory emergency contact (name and phone):	
Laboratory phone:	
Designated area (s) of these procedures with chemicals(s): (building and room):	
Agent storage location (building and room) and specifics regarding location/container/cabinets:	

Chemical Information

Chemical Name(s), including CAS No:   	Phenol (CAS 108-95-2)
GHS Classification and Hazard Statements (see SDS sheet provided by the chemical's manufacturer): PERMISSIBLE EXPOSURE LIMIT =5.0 ppm When pure, phenol has a sweet, tar-like odor that is readily detected at low concentrations (0.05 ppm in air). It is considered Particularly Hazardous due to need for specialized first aid and systemic toxicity from skin contact. Severe systemic toxicity can result from exposure via any route and can affect the nervous system, heart, blood vessels, liver, lung and/or kidneys, possibly leading to death. Phenol is very hazardous in case of skin contact – it is toxic and corrosive, causing painful burns and rapid absorption that may lead to systemic toxicity. Skin exposure results in pain, then numbness, blanching and severe burns. May cause severe eye injury (including blindness) if it contacts the eyes. Serious effects from inhalation exposure are less likely if effective engineering controls and work practices are used. Special care is needed when heating phenol, or in case of a spill. If inhaled, phenol can cause upper respiratory irritation, lung damage, or systemic effects. Toxic by ingestion NOTE: TRIzol reagent presents the additional hazard of releasing a toxic gas when in contact with acids or bleach, as well as the hazards from phenol.	

Signs and symptoms of exposure or release	Exposure to phenol may cause irritation to the skin, eyes, nose, throat, and nervous system. Some symptoms of exposure to phenol are weight loss, weakness, exhaustion, muscle aches, and pain.
Routes of exposure	Inhalation, skin contact, ingestion, parenteral inoculation, splash to eyes and mucous membranes.
Required engineering controls: (i.e., chemical fume hood, biological safety cabinet, glove box, temperature control, humidity control, shielding, luer-lock syringe, in-line HEPA filter, etc.)	Eyewash required in immediate work area. For >50 ml of >25% phenol, a safety shower is also required. Work in a fume hood with open containers (>50 ml) or when heating. Small volumes (<50 ml) can be handled safely on the benchtop at or below room temperature, as long as skin and eye contact is avoided.
Personal Protective Equipment (PPE) required for procedures:	Doubled pair 4 mil or one pair 8 mil nitrile gloves with extended cuffs. Immediately change contaminated gloves. Use Viton®-butyl or Silver Shield® gloves for hands with a skin condition or an impervious apron for torso with a skin condition.* Splash goggles, Fully buttoned lab coat, For splashes, wear face shield over goggles, chemical resistant sleeves, and impervious apron *If phenol and chloroform will be used together, please note that chloroform penetrates nitrile gloves even more readily than phenol and can degrade the gloves, allowing phenol to contact the skin.
Known incompatibilities with chemical(s):	Store in secondary containment away from moisture, strong oxidizers, strong bases, sulfuric acid, nitric acid, water + heat, and chemically active metals, such as aluminum or magnesium powder, sodium, potassium, and lithium. May be corrosive to plastics or rubber. Phenolic resins, PVC, neoprene, saran, and polyethylene are generally unsuitable storage container materials for phenol.
Special storage and handling considerations:	Transport phenol in secondary containment, preferably a clean polyethylene or other non-reactive acid/solvent bottle carrier. Keep container in cool, well-ventilated area (NOT a cold room). Keep container tightly closed when not in use. Store below eye level and avoid storing on the floor. Avoid ignition sources.
Please list the approximate amount(s) of chemical(s) utilized in all procedures	

Please describe, in a stepwise fashion, the work practices and procedures involved in the handling and utilization of this agent.

Please be clear and complete in the description of procedures (i.e., measuring, weighing, pouring, mixing, injection, mixing, transporting, administration to animals, heating, etc.).

Be sure to include any precautionary safety steps undertaken during these procedures.

Please submit additional pages, if necessary.

Waste collection and disposal procedures:	Waste chemicals shall be collected in a secured area. The area shall be free from evidence of spills. A Hazardous Waste label shall be affixed to the collection container and components shall be listed on the label as they are introduced into the container. Do not date containers until the day of scheduled pickup. Additionally, the container shall be marked with the hazard class of the chemical waste (i.e., Ignitable, Toxic, Reactive, Corrosive). When the container is no more than 2/3 full, date the container and submit a pick-up request in the UK E-trax system: https://etrax.chematix.com/Chematix/
Spill procedure: Lab Specific Notes on Spill Response: Do not use double nitrile gloves for spills due to phenol's very serious effects via skin.	Major spills of stock solution: Leave the area and notify others not to enter. Report the spill to the UK Environmental Quality Management Department (EQMD) at (859) 323-6280 (M-F 8am-5pm) or after hours by dialing 911 from any on-campus phone or by contacting the UK Police at (859) 257-UKPD (8573). Minor spills of manageable amount: If necessary, contact EQMD for guidance. Consult manufacturer's SDS for instructions and compatibilities for your chemical (Be aware of any materials such as paper towels or water that could be incompatible with your spilled chemical!)
Response procedures in the case of an incident or injury:	UK Employees: • After receiving first aid (refer to the chemical's SDS), report the occupational exposure to a hazardous chemical to UK Worker's Care at 1-800-440-6285. • If needed, an appointment will be made for the employee at UK UHS. • For severe emergency or injury, call 911 or proceed to the UK Chandler Hospital Emergency Department UK Students: • Call UHS at (859) 323-APPT to report an occupational exposure to a chemical hazard. • If needed, an appointment will be made for the employee at UK UHS. For severe emergency or injury, call 911 or proceed to the UK Chandler Hospital Emergency Department Additional Lab-Specific Emergency Procedures: SEE ATTACHED PHENOL EXPOSURE FIRST AID INSTRUCTIONS

A copy of the manufacturer's SDS for this agent and the PI approved SOP shall be kept in the lab's Chemical Hygiene Plan (CHP). The CHP shall be stored in a location known to all laboratory personnel and is accessible during work hours.

Personnel Training

- Prior to conducting any work with (name of the chemical), designated personnel must be provided training specific to the hazard involved in working with the substance.
- The PI must provide his/her lab personnel with a copy of the SOP and a copy of the SDS provided by the manufacturer. Any further training materials must be documented and stored in the lab's Laboratory Safety Manual and available to internal UK or external oversight agency inspectors.
- The PI must ensure that his/her lab personnel have completed the initial and the consecutive annually required Chemical Hygiene trainings and Hazardous Waste training.

The undersigned have read and understood the content of this SOP and the SDS for: **Phenol**

[illegible]

SOP Reviewed and Approved by:

PI: (typed name)	
PI: (signature and date)	
Lab Manager/Supervisor (typed name)	
Lab Manager/Supervisor (signature and date)	

PHENOL – CHEMICAL SPECIFIC FIRST AID

Research labs using phenol shall have the following first aid supplies on hand.

At minimum:

1 liter pharmaceutical (USP or NF) grade polyethylene glycol (PEG), 300 or 400 molecular mass (e.g., Kollisolv® PEG 400).
Laminate film gloves (Silver Shield®) or reusable Viton® or Viton®-butyl gloves.
10 gauze pads or sponges at minimum (Sterile or non-sterile).
More gauze pads may be necessary if large amounts of phenol are used.
Large poly bags for waste (e.g., 1 gallon Ziploc®).
Copy of these guidelines.

Other highly recommended items (If more than 50 ml of phenol is used regularly in the lab):

At least 25 total gauze pads or sponges.
Large cotton roll (e.g., VWR 470161-446) and/or wiping cloths (e.g., VWR 500030-610; -611).
Large squeeze-bottle of liquid hand soap. (A squeeze bottle allows much faster application than a pump dispenser.)
Tyvek® coveralls for use if clothing is contaminated and not able to be worn.
First Aid instructions for contaminated skin (see note about eye exposure below):
Decontamination must begin as soon as possible to minimize phenol absorption.

INSTRUCTIONS FOR EXPOSURE:

Phenol has local anesthetic properties and can cause extensive damage before pain is felt.

While decontamination is ongoing, have a colleague call Worker's Care (800-440-6285) or, if the injured individual is a student or visitor, contact UHS (859-323-2778) for advice on seeking medical attention based on the size & severity of the burn. If phenol is left on the skin, it will penetrate rapidly and lead to cell death. Skin exposures affecting >60 in² (>380 cm²) could be fatal.

1. Move away from the spill location if possible.
2. Those providing first aid shall don protective gloves (laminate, Viton® or Viton®-butyl), safety goggles (or glasses if goggles are not available), and lab coat. Nitrile gloves may be worn over laminate to improve dexterity. Do not put gloves on contaminated hands! The injured person, if able, can assist.
3. Remove contaminated clothing immediately, including any contaminated leather items.
4. Ensure you have bags open and available to collect contaminated gloves, clothing, and gauze or cloths that have been used to clean the affected area.
5. For small areas of skin, irrigate affected areas with PEG 300 or 400, or swab with gauze pads or cotton wiping cloths soaked in PEG immediately and repeatedly until the phenol smell is gone.

6. If PEG is not available or if you run out, use vegetable oil, isopropyl alcohol or soap and water.
7. If gauze or cotton wiping cloths are not available, irrigate area with PEG and use other absorbent material to gently wipe the affected area.
8. For large skin exposures, flush with COPIOUS amounts of water (safety shower or drench hose), then wash affected area with soap and water, flushing continually, for at least 15 minutes. (Soap helps disperse and remove phenol.) Keep reapplying soap throughout the 15 minutes. If phenol smell remains, use PEG as directed in number 5 above.
9. For splashes to the eyes, irrigate with COPIOUS amounts of water (eyewash or drench hose). Continue flushing for 15 minutes. Do not use lesser amounts of water, as this will only dilute the phenol and expand the area exposed instead of washing the phenol away.
10. After removing phenol from skin or eyes, seek immediate medical attention.
11. Double-bag any contaminated absorbent materials. Close & label bag; submit a chemical waste pickup request.
12. Double-bag contaminated clothing and personal items. UK Research Safety highly recommends disposing of contaminated clothing along with the contaminated absorbent material to prevent later contamination at home.
13. After the medical emergency is over, refill Phenol First Aid supplies to replenish any used items.
14. If not already reported via Worker's Care, report the exposure using the "Form 6" reporting link found on the UK Occupational Health and Safety website.