Chemical Risk Management Protocol

Safe Methods of Use (SMOU)

Phenol (concentrated)

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1 Purpose

This Safe Method of Use (SMOU) applies to principal investigators (PIs), laboratory managers, designated laboratory person (DLPs), and all staff and students who direct or participate in the use of phenol at the University of Auckland.

Note: the word 'shall denotes a mandatory requirement and the word 'should' denotes a recommendation.

2 Phenol

Phenol (hydroxybenzene) is highly corrosive and toxic 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.

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

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

Ensure that polyethylene glycol 300 or 400 (PEG 300 or PEG 400) is on hand whenever phenol is handled – See section 7.2 for more information.

3 Toxic effects

Acute effects

Phenol is irritating and corrosive to the skin. Because it has a local anaesthetic 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 and could cause blindness.

Chronic effects

Repeated or prolonged exposure to phenol or its vapours can affect the central nervous system, liver, and kidneys.

Good work practices can help reduce hazardous exposures.

4 Using Phenol Safely

- Ensure a copy of phenol Safety Data Sheet (SDS) is on hand and reviewed before handling the material.
- Work with pure 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.
- Ensure that there is immediate and unobstructed access to an eyewash/shower unit in the work area.
- Store phenol in a cool, dry, well-ventilated area, away from heated surfaces of ignition sources.
- Always wash hands thoroughly after handling phenol, even if gloves are used.

5 Storage

- Phenol is a combustible acid. It must be stored away from strong oxidizers (such as nitric acid and bromine) and strong bases (such as potassium hydroxide).

- Store below eye level to prevent injuries in case of a spill.

6 Personal Protective Equipment

- Eye protection in the form of safety glasses or goggles shall be used.
- Neoprene, viton/neoprene or butyl/neoprene gloves shall be worn.

7 Emergency Response Procedures

7.1 Spills

- 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, and evacuate the area.
- Small liquid spills of 50 ml or less may be absorbed on paper towelling, 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.

Refer to the Chemical Risk Management Protocol Guideline "2. Using Chemicals" section 11 for spill response instructions.

7.2 Skin Exposure

- Seek medical attention immediately. Contamination and consequent absorption through the skin with larger amounts of phenol may produce rapid collapse and death.
- Remove contaminated clothing. Swab contaminated area repeatedly with polyethylene glycol 300 or 400 or a mixture of polyethylene glycol 300/ ethanol 2:1. If no PEG is available, glycerine can be used.

- Rapid water dilution of phenol burns may increase systemic absorption by decreasing the extent of the coagulum and thus allowing greater absorption.[1] If water has been used already, ensure a copious amount of water is used to thoroughly flush the area.
- A copy of the SDS and these emergency procedures must be also taken to the hospital.

7.3 Eye Exposure

- Immediately hold eyelids apart and flush the eye continuously with running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
- Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes.
- Transport to hospital or doctor without delay.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

8 Disposal

Phenol waste should be placed in a container that is clearly labelled and has a securely sealed lid.

Reference

1. Ordog, G., *Ellenhorn's Medical Toxicology - Diagnosis and Treatment of Human Poisoning*. 2019.