

OHS Registration #:

Expiration Date:

**STANDARD OPERATING PROCEDURE/APPROVAL FORM  
FOR CARCINOGENS AND HIGHLY TOXIC MATERIALS**

**Instructions:** Please complete this form to request approval to use and possess highly toxic or carcinogenic material from the University Chemical Hygiene Committee as required by Chapter 12 of the University Chemical Hygiene Plan and University Policy 7-37.

**Submit a separate form for each chemical.** Copies of the current guidelines and Chemical Hygiene Plan are available at the DOHS web site: <http://www.udel.edu/OHS/>. For questions, please contact the University Chemical Hygiene Officer at 831-2103.

**Form Updated: January 2007**

**Please attach a detailed synopsis of how this material will be used in your research.**

**Section I – Information**

1. Principal Investigator(s): \_\_\_\_\_
2. E-Mail Address: \_\_\_\_\_
3. Department: \_\_\_\_\_
4. Address: \_\_\_\_\_
5. Phone Number: \_\_\_\_\_
6. Fax Number: \_\_\_\_\_
7. Lab(s) to be Used: \_\_\_\_\_
8. Chemical: Phenol and Phenol Solution

**Section II – Use and Storage**

**A. Purchasing**

All purchases of this material must have approval from the Principal Investigator (PI) or authorized personnel before ordering. The user is responsible to ensure that a current Material Safety Data Sheet (MSDS) is obtained unless a current one is already available within the laboratory. Quantities of this material will be limited to \_\_\_\_\_, and/or the smallest amount necessary to complete the experiment.

**B. Authorized personnel**

Please select the general categories of personnel who could obtain approval to use this material:

1.  Principal Investigator
2.  Graduate Students
3.  Undergraduates
4.  Technical Staff
5.  Post Doctoral Employees
6.  Other (Describe): \_\_\_\_\_

Please list the specific personnel and their approval level (Attach an addendum to this form for additional personnel):

**NOTE: The Principal Investigator must be aware of all purchases of this material. The Principal Investigator must assure the there is not an exceedance of the quantity limits.**

1. _____	<input type="checkbox"/> Purchase	<input type="checkbox"/> Use the Material
2. _____	<input type="checkbox"/> Purchase	<input type="checkbox"/> Use the Material
3. _____	<input type="checkbox"/> Purchase	<input type="checkbox"/> Use the Material
4. _____	<input type="checkbox"/> Purchase	<input type="checkbox"/> Use the Material
5. _____	<input type="checkbox"/> Purchase	<input type="checkbox"/> Use the Material

The Principal Investigator will update this section when any personnel changes occur. If changes occur, document the changes (include the record of training of additional personnel) in the laboratories files and submit an addendum to the University Chemical Hygiene Officer with all training documentation.

### C. Storage

Materials will be stored according to compatibility and label recommendations in a designated area.

1. Please list compounds that this chemical is incompatible with:

- Inorganic Acids
- Oxidizing Material
- Reducing Agents such as hydrides, nitrides, alkali metals and sulfides
- Other: \_\_\_\_\_

2. Please list special storage requirements (I.E.: Refrigerated, Inert Atmosphere, Desiccated, etc.):

- Do not store above 60 deg C
- Store away from incompatible materials
- Other: \_\_\_\_\_

3. Please list specific storage area (This Area Must be Marked and Labeled): \_\_\_\_\_

Storage areas will be inspected by laboratory personnel on a regular basis. Personnel will check for safety concerns such as improper storage, leaking/damaged container(s), damaged labels, quantities in excess of approved limits, theft/disappearance of material, etc. The inspector will also determine if an inventory reduction is possible. The Principal Investigator will designate one individual to complete this inspection.

4. Please select an inspection frequency:

- Weekly                       Biweekly  
 Bimonthly                       Monthly

### D. Use location:

Materials shall be used only in the following designated areas.

Check all that apply:

1.  Demarcated Area in Lab (Describe): \_\_\_\_\_
2.  Fume Hood
3.  Glove Box
4.  Other (Describe): \_\_\_\_\_

**E. Procedural Steps:**

1. \_\_\_\_\_

**Section III – Personnel Safety and Protection**

**A. Training requirements:**

All users must demonstrate competency and familiarity regarding the safe handling and use of this material prior to purchase. The Principal Investigator is responsible for maintaining the training records for each user of this material. Training should include the following:

1. Review of current MSDS
2. Chemical Hygiene/Right-To-Know
3. Chemical Waste Management
4. Review of the OSHA Lab Standard
5. Review of the Chemical Hygiene Plan
6. Special training provided by the department/supervisor
7. Review of the departmental safety manual if applicable
8. Safety meetings and seminars
9. One-on-One hands-on training with the Principal Investigator or other knowledgeable laboratory personnel.
10. Other: \_\_\_\_\_

**B. Personal Protective Equipment:**

All personnel are required to wear the following personal protective equipment whenever handling this material:

1. Proper Laboratory Attire (Pants or dresses/shorts below the knees, sleeved shirt, close-toe shoes)
2. Safety Glasses – **Researchers must upgrade to chemical safety splash goggles if a splash, spray or mist hazard exists. In general, safety glasses can be worn if the fume hood sash is properly positioned to provide the splash, spray and mist protection, otherwise indirect venting chemical safety splash goggles must be worn.**

3. Lab Coat
4. Chemical Protective Gloves: Viton, Butyl Rubber, Neoprene or Silver Shied

Personnel may be required to wear other Personal Protective Equipment when working with this material. The Principal Investigator should contact the University Chemical Hygiene Officer to discuss the selection of chemical protective clothing (aprons, suits and gloves) and respirators. Please check all that apply:

1. <input type="checkbox"/> Chemical Safety Splash Goggles	2. <input type="checkbox"/> Face Shield
3. <input type="checkbox"/> Chemical Protective Clothing (Describe): _____	
4. <input type="checkbox"/> Chemical Protective Splash Apron (Describe): _____	
5. <input type="checkbox"/> Respirator (Type): _____	
6. <input type="checkbox"/> Other (Describe): _____	

### C. Safe Work Practices

The following safe work practices should be employed when using this material:

1. Wear all required personal protective equipment
2. Cover open wounds
3. Wash hands thoroughly when work with the material is completed
4. No mouth pipetting
5. Use of sharps, such as glass Pasteur pipettes, needles, razor blades, etc. should be avoided or minimized
6. Must not work alone in the laboratory
7. Please list any other safe work practices: \_\_\_\_\_

### D. Personnel Decontamination

For most exposures, decontamination should occur as follows:

1. Small Skin Exposures –
  - a. Remove contaminated clothing rapidly and irrigate or wipe exposed areas immediately and repeatedly with low-molecular-weight polyethylene glycol (PEG 300 or PEG 400) which can be diluted to 50% for easier application. Treatment should be continued until there is no detectable odor of phenol. If PEG is not available, a glycerine solution can be used instead. If neither of these are available, irrigation with a high-density shower will reduce phenol uptake, but lesser amounts of water will merely dilute the phenol and expand the area of exposure. After treatment with the high pressure shower, the skin should be washed with soap and water for at least 15 minutes. **Decontamination must begin as soon as possible to minimize phenol absorption.** Double-bag contaminated clothing and personal belongings. After skin contamination, keep patient under observation for at least 24-48 hours. Phenol-decontaminating fluid is more effective than

water in removing phenol from the skin and retarding absorption; olive oil or vegetable oil may also be used; do not use mineral oil. Rapid water dilution of phenol burns may increase systemic absorption by decreasing the extent of the coagulum and thus allowing greater absorption (1).

(1) Ellenhorn and Barceloux: Medical Toxicology: Diagnosis and Treatment of Human Poisoning.

- b. Have buddy locate the MSDS
- c. Contact Occupational Health and Safety at 831-8475 for further direction

2. Eye Exposure –

- a. Locate the emergency eye wash
- b. Turn eye wash on and open eyelids with fingers
- c. Rinse eyes for 15 minutes
- d. Have buddy contact 911 for the Newark Campus, 9-911 for all others and locate the MSDS
- e. Notify OHS

3. Large Body Area Exposure –

- a. Remove contaminated clothing rapidly and irrigate or wipe exposed areas immediately and repeatedly with low-molecular-weight polyethylene glycol (PEG 300 or PEG 400) which can be diluted to 50% for easier application. Treatment should be continued until there is no detectable odor of phenol. If PEG is not available, a glycerine solution can be used instead. If neither of these are available, irrigation with a high-density shower will reduce phenol uptake, but lesser amounts of water will merely dilute the phenol and expand the area of exposure. After treatment with the high pressure shower, the skin should be washed with soap and water for at least 15 minutes. **Decontamination must begin as soon as possible to minimize phenol absorption.** Double-bag contaminated clothing and personal belongings. After skin contamination, keep patient under observation for at least 24-48 hours. Phenol-decontaminating fluid is more effective than water in removing phenol from the skin and retarding absorption; olive oil or vegetable oil may also be used; do not use mineral oil. Rapid water dilution of phenol burns may increase systemic absorption by decreasing the extent of the coagulum and thus allowing greater absorption (1).

(1) Ellenhorn and Barceloux: Medical Toxicology: Diagnosis and Treatment of Human Poisoning.

- b. Have buddy contact 911 for the Newark Campus, 9-911 for all others and locate the MSDS
- c. Notify OHS

4. Ingestion Emergencies –

- a. If swallowed do NOT induce vomiting.
- b. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
- c. Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious
- d. Have buddy contact 911 for the Newark Campus, 9-911 for all others and locate the MSDS
- e. Notify OHS

5. Inhalation Emergencies –

- a. If fumes or combustion products are inhaled remove from contaminated area.
- b. Lay patient down. Keep warm and rested.
- c. Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- d. Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.
- e. Have buddy contact 911 for the Newark Campus, 9-911 for all others and locate the MSDS
- f. Notify OHS

6. Injection Emergencies –

- a. Clean the areas with soap and water
- b. Allow the wound to bleed
- c. Have buddy contact 911 for the Newark Campus, 9-911 for all others and locate the MSDS
- d. Notify OHS

Please list any special decontamination procedures:

Remove contaminated clothing, swab repeatedly with glycerin or PEG (polyethylene glycol). Phenol-decontaminating fluid is more effective than water in removing phenol from the skin and retarding absorption; olive oil or vegetable oil may also be used; do not use mineral oil. Rapid water dilution of phenol burns may increase systemic absorption by decreasing the extent of the coagulum and thus allowing greater absorption (1).

(1) Ellenhorn and Barceloux: Medical Toxicology: Diagnosis and Treatment of Human Poisoning.

### E. Exposure Symptoms

Please list the emergency procedures to be followed in the event of an exposure. These will be found in the MSDS for the compounds:

1. **Eye Contact Symptoms:** The material can produce chemical burns to the eye following direct contact. Vapors or mists may be extremely irritating. If applied to the eyes, this material causes severe eye damage. The vapor when concentrated has pronounced eye irritation effects and this gives some warning of high vapor concentrations. If eye irritation occurs seek to reduce exposure with available control measures, or evacuate area. The material may produce severe irritation to the eye causing pronounced inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis. Some phenol derivatives may produce mild to severe eye irritation with redness, pain and blurred vision. Permanent eye injury may occur; recovery may also be complete or partial.
2. **Skin Contact Symptoms:** Skin contact with the material may be harmful; systemic effects may result following absorption. Skin contact with the material may produce toxic effects; systemic effects may result following absorption. The material can produce chemical burns following direct contact with the skin. Phenol and its derivatives can cause severe skin irritation if contact is maintained, and can be absorbed to the skin affecting the cardiovascular and central nervous system. Effects include sweating, intense thirst, nausea and vomiting, diarrhea, cyanosis, restlessness, stupor, low blood pressure, hyperventilation, abdominal pain, anemia, convulsions, coma, lung swelling followed by pneumonia. Respiratory failure and kidney damage may follow. The material may cause severe skin irritation after prolonged or

repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin.

3. **Ingestion Symptoms:** Accidental ingestion of the material may be harmful; animal experiments indicate that ingestion of less than 150 gram may be fatal or may produce serious damage to the health of the individual. Toxic effects may result from the accidental ingestion of the material; animal experiments indicate that ingestion of less than 40 gram may be fatal or may produce serious damage to the health of the individual. The material can produce chemical burns within the oral cavity and gastrointestinal tract following ingestion. Ingestion may result in nausea, abdominal irritation, pain and diarrhea. Some phenol derivatives can cause damage to the digestive system. If absorbed, profuse sweating, thirst, nausea, vomiting, diarrhea, cyanosis, restlessness, stupor, low blood pressure, gasping, abdominal pain, anemia, convulsions, coma and lung swelling can happen followed by pneumonia. There may be respiratory failure and kidney damage. Chemical burns, seizures and irregular heartbeat may result.
4. **Inhalation Symptoms:** Harmful by inhalation. Toxic by inhalation. If inhaled, this material can irritate the throat and lungs of some persons. If phenols are absorbed via the lungs, systemic effects may occur affecting the cardiovascular and nervous systems. Inhalation can result in profuse perspiration, intense thirst, nausea, vomiting, diarrhea, cyanosis, restlessness, stupor, falling blood pressure, hyperventilation, abdominal pain, anemia, convulsions, coma, swelling and inflammation of the lung. This is followed by respiratory failure and kidney damage. Phenols also cause loss of sensation and general depression at high concentrations. The toxicities of phenol derivatives vary.

The ChemWatch MSDS, which is available at <http://www.udel.edu/OHS/> oftentimes, has treatment information for Emergency Room Personnel and Doctors to follow. Please list any information that can be provided to assist with the treatment:

Persons with a history of convulsive disorders or abnormalities of the skin, respiratory tract, liver or kidneys would be expected to be at increased risk from exposure. Examination of the liver, kidneys and respiratory tract should be stressed. A urinalysis should be performed including at a minimum, specific gravity, albumin, glucose, and a microscopic on centrifuged sediment. (Source: NIOSH Sept. 1978.) For acute or short term repeated exposures to phenols/ cresols:

- Phenol is absorbed rapidly through lungs and skin.
- Massive skin contact may result in collapse and death\*
- Ingestion may result in ulceration of upper respiratory tract; perforation of esophagus and/or stomach, with attendant complications, may occur. Esophageal stricture may occur.\*
- An initial excitory phase may present. Convulsions may appear as long as 18 hours after ingestion. Hypotension and ventricular tachycardia that require vasopressor and antiarrhythmic therapy, respectively, can occur.
- Respiratory arrest, ventricular dysrhythmias, seizures and metabolic acidosis may complicate severe phenol exposures so the initial attention should be directed towards stabilization of breathing and circulation with ventilation, intubation, intravenous lines, fluids and cardiac monitoring as indicated.
- Vegetable oils retard absorption; do NOT use paraffin oils or alcohols. Gastric lavage, with endotracheal intubation, should be repeated until phenol odor is no longer detectable; follow with vegetable oil. A saline cathartic should then be given.\*
- ALTERNATELY: Activated charcoal (1g/kg) may be given. A cathartic should be given after oral activated charcoal.
- Severe poisoning may require slow intravenous injection of methylene blue to treat methaemoglobinaemia.
- Renal failure may require hemodialysis.\*

- Most absorbed phenol is biotransformed by the liver to ethereal and glucuronide sulfates and is eliminated almost completely after 24 hours. [Ellenhorn and Barceloux: Medical Toxicology] \*[Union Carbide]

#### BIOLOGICAL EXPOSURE INDEX - BEI

These represent the determinants observed in specimens collected from a healthy worker who has been exposed to the Exposure Standard (ES or TLV):

Determinant	Index	Sampling Time	Comments
1.Total phenol in blood	250 gm/gm creatinine	End of shift	B, NS

B: Background levels occur in specimens collected from subjects NOT exposed  
 NS: Non-specific determinant; also seen after exposure to other materials.

#### F. Spills

The laboratory should be prepared to clean up minor spills (25 ml/25 g or less) of highly toxic/carcinogenic materials should they occur in a properly operating fume hood. Chemical spill clean up guidance can be found at <http://www.udel.edu/OHS/chemspillkit/chemspillkit.html>. Laboratory personnel cleaning up a spill will wear all personal protective equipment listed above and manage all cleanup debris according to the waste disposal section. Notify OHS of any spills, even if the lab staff handled the clean-up.

Please list the following:

1. Location of Spill Cleanup Materials for a small spill: \_\_\_\_\_
2. Any special measures/cleanup material required to cleanup a spill:
  - a. Notify other occupants that a spill has occurred
  - b. Remove or control all ignition sources
  - c. Don appropriate personal protection equipment
  - d. Avoid generating dust. Use a HEPA vacuum or wet methods to clean up the spill. Cover the spill with a paper towel and soak with water.
  - e. Small spills should be cleaned with absorbent paper and soap and water. The surface will be then decontaminated with a glycerin or polyethylene glycol solution.
  - f. Decontaminated the area with a neutral cleaner
  - g. Place clean up material in a suitable labeled container for hazardous waste disposal

If a spill is large or occurs outside of a fume hood, the laboratory occupants should immediately vacate the laboratory, close all doors and contact Occupational Health & Safety at 831-8475 during working hours or 911 after hours. If the laboratory personnel determine that the spill is not contained to the lab or could cause harm to people outside the laboratory, they should pull the building fire alarm and go to the Emergency Gathering Point to await the University Police and Emergency Responders. The responsible/knowledgeable person should provide the University Police and the Emergency Responders with the following:

1. Common Name of the Material Involved
2. A copy of a MSDS, if possible
3. Any pertinent information related to the emergency, such as location in the lab, other hazards in the lab, etc.

#### G. Emergency Phone Numbers:

Below are a list of emergency numbers to contact in the event of an emergency:

1. Police, Fire or Medical Emergency, call – 911 on the Newark Campus, 9-911 for all others



## 2. Occupational Health & Safety – X8475

Please provide a list of other emergency phone numbers, such as after hour contacts for laboratory personnel or any other important phone number, to be used in the event of an emergency: \_\_\_\_\_

### **H. Other Special precautions**

Please list any other special precautions or procedures not listed in the above sections. Please be as specific as possible: \_\_\_\_\_

### **I. Chronic Health Effects**

Cumulative effects may result following exposure. This material can cause serious damage if one is exposed to it for long periods. It can be assumed that it contains a substance which can produce severe defects. This has been demonstrated via both short- and long-term experimentation.

Long-term exposure to phenol derivatives can cause skin inflammation, loss of appetite and weight, weakness, muscle aches and pain, liver damage, dark urine, loss of nails, skin eruptions, diarrhea, nervous disorders with headache, salivation, fainting, discoloration of the skin and eyes, vertigo and mental disorders, and damage to the liver and kidneys. Chronic phenol poisoning is very rarely reported, but symptoms include vomiting, difficulty in swallowing, diarrhea, lack of appetite, headache, fainting, dizziness, dark urine, mental disturbances, and possibly skin rash. Death due to liver and kidney damage may occur. Repeated exposure of animals to phenol vapor at concentrations ranging from 26 to 52 ppm has produced respiratory, cardiovascular, hepatic, renal and neurological toxicity. Administration of phenol in the drinking water of mice (2500 ppm for 103 weeks) produced an increased incidence of leukemia and lymphomas. Phenol has been studied in initiation/promotion protocols with a number of polycyclic hydrocarbons and has been shown to have promoting activity in the two-stage skin model.

### **Section VI – Waste Disposal**

The authorized person using this material is responsible for the safe collection, preparation and proper disposal of waste unless otherwise stated below. Waste shall be disposed of as soon as possible and in accordance with all laboratory and University procedures. All personal must obtain chemical waste disposal training via DOHS.

Specific instructions:

1. Collect solid waste material in a 7 mil polyethylene bag or other sturdy bag labeled with an orange chemical waste labeled. If possible utilize the OHS approved solid waste disposal box.
2. Collect liquid waste in a "Justrite" container provided by DOHS. Label with a hazardous waste label.
3. Use proper laboratory ventilation such as a fume hood to manage both liquid and solid wastes.
4. Contact DOHS for removal.
5. Do not put in the normal trash or pour any solutions down the drain.
6. Other Procedures:

### **Section V – Signature and Verification**

Your signature below indicates that you have completed this form accurately to the best of your knowledge, you acknowledge all requirements and restrictions of this form and that you accept responsibility for the safe use of the material.

1. Prepared By: \_\_\_\_\_

Date: \_\_\_\_\_

Signature: \_\_\_\_\_

2. Principal Investigator: \_\_\_\_\_

Date: \_\_\_\_\_

Signature: \_\_\_\_\_

**Section VI – Approval Process**

**A. Departmental Chemical Hygiene Officer Approval**

The Principal Investigator should have this form completed as accurately as possible. Meet with the local Department Chemical Hygiene Officer and review the SOP.

1. Departmental CHO: \_\_\_\_\_

Date: \_\_\_\_\_

Signature: \_\_\_\_\_

**B. University Chemical Hygiene Officer Approval**

The Principal Investigator should have this form completed as accurately as possible. Please e-mail or fax this form to the University Chemical Hygiene Officer at [eich@udel.edu](mailto:eich@udel.edu) or 831-1528. The Chemical Hygiene Officer will review and verify the form and make any necessary changes or updates.

2. University CHO: \_\_\_\_\_

Date: \_\_\_\_\_

Signature: \_\_\_\_\_

**C. Approval Expiration**

The approval for use and purchase of this material will expire should any of the approved information change, with the exception of Section II, B and C, Authorized Personnel and Storage Location, or two years after CHC approval. If, at the end of two years, the procedure is substantially the same, the Principal Investigator can complete a renewal form and send it to the University CHO, who can approve the renewal for an additional two years.

### CHECKLIST FOR POSSESSION AND USE OF CARCINOGENS

The checklist is provided to assist a researcher with the approval process for possession and use of carcinogens. This form may be kept on file in the laboratory with the SOP to serve as documentation. The complete procedure can be found in the University Chemical Hygiene Plan in Chapter 12.

Date and Initial	
_____	1. Complete a Standard Operating Procedure/Approval Form For Carcinogens and submit this form to OHS for review
_____	2. Review and make OHS's changes and recommendations
_____	3. Meet the Departmental Chemical Hygiene Officer to review the approval form and the use of the material.
_____	4. Submit (via campus mail) the completed and signed form back to the University Chemical Hygiene Officer for final approval to purchase and use the material.
_____	5. Complete a Job Hazard Analysis (JHA) for each experiment in which this compound is used. These JHAs must be kept on file in the laboratory and updated every 5 years or when a process changes.
_____	6. Provide and document training for every worker who will use the material. Training shall include hands-on instruction as well as review of the JHA, SOP and the University Chemical Hygiene Plan; specifically Chapter 12.