



## Laboratory-Specific Standard Operating Procedures

### **TITLE: SOP for the safe use of N,N-Dimethylformamide (DMF)**

Date: \_\_\_\_\_ Review Date: \_\_\_\_\_ Revised: \_\_\_\_\_

Principle Investigator: \_\_\_\_\_

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This SOP must be kept on file for all laboratory employee training and review.

#### **Section 1: (Check One)**

There are three methods that can be used to write SOPs. They are: by process (distillation, synthesis, chromatography, etc.); by individual hazardous chemical (benzene, phenol, arsenic, etc.); and by hazardous chemical class (flammable, corrosive, oxidizer, etc.).

\_\_\_\_\_ Process                       Chemical                      \_\_\_\_\_ Hazard Chemical Class

#### **Section 2: Describe Process, Hazardous Chemical or Hazard Class**

Provide a general description of what activities are covered under this SOP.

- Dimethylformamide (CAS # 68-12-2) is a water-white liquid with a faint fishy odor and derivative of formamide that serves as a polar, aprotic solvent frequently used to facilitate organic chemistry reactions.
- Its hydrophilic properties allow miscibility with water and organic liquids, and it is used as a reagent in a variety of experiments. For example, it can be used as a solvent for making X-Gal Solution that contains the inert chromogenic substrate for beta galactosidase hydrolysis.
- DMF is unstable in the presence of strong acids and bases and can convert to formic acid and dimethylamine. It is otherwise rather stable with a high boiling point that makes it useful for certain types of chemical reactions and as a solvent.
- Can penetrate plastics, intact skin, and be inhaled.

### **Section 3: Potential Hazards**

Describe the potential hazards for each process, hazardous chemical or hazard class. Include physical and health hazards.

- DMF has been linked to cancer in humans, and it is thought to cause birth defects (embryotoxicity.) In some sectors of industry, women are banned from working with DMF. For many reactions, it can be replaced with dimethyl sulfoxide.
- Most manufacturers list DMF as a chronic health hazard in the SDS since DMF is not readily disposed of by the body. According to IARC, DMF is a possible carcinogen, although EPA does not consider it a cancer risk.
- Overexposure to DMF could result in hepatotoxicity, alcohol intolerance, and teratogenicity in humans and animals, and decline of human sperm motility.
- Reactions including the use of sodium hydride in DMF as a solvent are somewhat hazardous; exothermic decompositions have been reported at temperatures as low as 26°C.

### **Section 4: Personal Protective Equipment**

Identify the required PPE. If a respirator is required, contact EH&S before using.

- Neoprene and rubber gloves are recommended (can penetrate other glove materials); Use proper glove removal technique to avoid any skin contact.
- Use chemical splash goggles.
- Face shield is also recommended.
- Chemical resistant lab coats.
- Full length pants and closed-toed shoes must be worn all the time.
- Use Respirators when Permissible Exposure Limit (PEL) has exceeded.

### **Section 5: Engineering Controls**

Describe engineering controls that will be used to prevent or reduce employee exposure to hazardous chemicals.

Handle using a chemical fume hood with good ventilation and electrically grounded lines and equipment.

## **Section 6: Special Handling and Storage Requirements**

List storage requirements for hazardous chemicals involved with the SOP, including specific area, and policies regarding access to chemicals. Special procedures such as dating peroxide formers are appropriate here. Is a special “designated area” required?

### **Safe handling:**

- Avoid contact with skin and eyes.
- Avoid inhalation of vapor or mist.
- Keep away from sources of ignition - No smoking.
- Take measures to prevent the buildup of electrostatic charge.

### **Safe storage:**

- Keep container tightly closed in a dry and well-ventilated place.
- Containers which are opened must be carefully resealed and kept upright to prevent leakage.
- Handle and store under inert gas.

## **Section 7: Spill and Accident Procedures**

Indicate how spills or accidental release will be handled. List the location of appropriate emergency equipment. Any special requirements for protection of personal from exposure should be identified here.

- For Accidents:
  - Immediately flush eyes with copious amounts of cold water for at least 15 minutes.
  - For skin contact, immediately wash the affected area with water.
  - Evacuate the spill area to avoid breathing in vapors.
  - Keep others from entering the spill area.
- For Spills:

Chemical spill kit is located in cabinet under the sink. For all spills, large or small, refer to the [EHS 200.002, Chemical Spill Response Procedures](#) (See attachment for spill response procedures). For large spills and accidents, place absorbent material on the spill, evacuate, and contact University Police (568-8999) or EH&S (952-1337).

## **Section 8: Decontamination Procedures**

Specify decontamination procedures to be used for equipment, glassware, and clothing: including equipment such as hoods, lab benches, and controlled (special “designated area”) areas within the lab.

Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.

### **Section 9: Waste disposal Procedures**

Waste must be disposed in accordance with [LSUHSC EHS 200.04, Chemical Waste Management Procedures](#).

- Label Waste as “HAZARDOUS WASTE– DMF” and the date collection began.
- Store Waste - Store hazardous waste in closed containers, in secondary containment and in a designated location.
- Double-bag contaminated dry waste AND SPILL CLEAN UP MATERIALS using transparent bags.
- Dispose of Waste - Dispose of regularly generated chemical waste within 90 days.
- To schedule a waste pick-up by EH&S, use the [bob.lsuhs.edu](http://bob.lsuhs.edu) service request system.