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Developed By: University Department of Environmental Health and Safety

## **Standard Operating Procedures For Handling, Storage and Disposal of Thionyl Chloride**

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### **Purpose**

The purpose of this document is to establish specific standard operating procedures for handling, storage, and disposal of thionyl chloride. The requirements established in this SOP are in conjunction with the University's Chemical Hygiene Plan.

### **Overview**

Thionyl chloride is a corrosive inorganic compound, commonly used in chlorination reactions, such as the production of organochlorine compounds and anhydrous metal chlorides, and is used as a component of lithium-thionyl chloride batteries.

Thionyl chloride is a water-reactive compound that can explosively release gases on contact with any form of moisture. It will decompose in water and at temperatures over 140°C (284°F), potentially releasing toxic gases such as sulfur dioxide, sulfur chloride or hydrogen chloride. Hydrogen gas may be evolved if thionyl chloride, moisture, and metals are in contact. Thionyl chloride causes burns on contact and its vapors may irritate the skin, eyes, and respiratory tract.

Industrial production of thionyl chloride is controlled under the Chemical Weapons Convention, where it is listed in Schedule 3. It is used in the production of G-series nerve agents.

### **Standard Operating Procedures**

#### *Handling*

1. The Material Safety Data Sheet and this SOP must be reviewed before use of thionyl chloride in the laboratory.
2. The laboratory's principal investigator must develop specific written experimental procedures for the use of thionyl chloride in the laboratory before any work can be permitted

to begin. The written procedures must be approved by the Department of Environmental Health and Safety.

3. All manipulations with thionyl chloride, especially those that can generate vapors, fumes or sprays, must be done in a properly working chemical fume hood, glove box, local exhaust system or other suitable containment device that exhaust directly outside.
4. Proper personal protection equipment (PPE) must be worn at all times to prevent eye and skin contact. Consult the MSDS for PPE recommendations. The minimum requirements are lab coats, chemical safety goggles, and rubber or neoprene gloves.
5. Be sure to inspect all PPE prior to and after use.
6. The laboratory must be equipped with a working eyewash station and safety shower.
7. Always practice good laboratory hygiene. Wash hands, face, neck and forearms frequently. Wash hands before eating and do not eat, drink, or smoke in the laboratory.
8. Keep good housekeeping procedures. All disposable materials contaminated with thionyl chloride must be disposed as hazardous waste.
9. Containers of this product may be hazardous when empty as they may contain product residues (vapors, liquids).

#### *Storage*

1. Thionyl chloride must be stored in a cool, dry well-ventilated location. A standard acidic liquids storage room or cabinet is sufficient.
2. Isolate this material from incompatible materials. Reacts with water, ammonia and other bases, alcohols, amines, most common metals, dimethyl sulfoxide, chloryl perchlorate, linseed oil, quinoline, sodium, 2,4-hexadiyn-1-6-diol, *o*-nitrobenzoylactic acid, and *o*-nitrophenylacetic acid.
3. Due to the hazardous nature of the material only minimal quantities of material should be purchased and stored.

#### *Disposal*

1. All waste must be collected in a sealable compatible container and disposed as hazardous waste as per University Hazardous Waste Guidelines.
2. All residual materials and rinsate from empty containers of this material must be collected and disposed as hazardous waste.
3. The rinsate from decontamination of all non-disposable equipment must be collected and disposed as hazardous waste.
4. All disposable materials contaminated with this material must be disposed as hazardous waste.
5. A chemical pick-up request form must be completed and submitted when the hazardous waste needs to be removed.