

Example Toxin SOP - Diphtheria Toxin

Laboratory Information
Title of the project:
PI Name:
Lab location:
Email:
Date of review:

Emergency Procedures
<p><i>(Describe what procedures should be followed in the event of an emergency including phone # floor plan, exits, location of emergency equipment like eyewash/safety shower, fire extinguisher etc.)</i></p> <p>Exposure First Aid Procedures:</p> <ul style="list-style-type: none"> For all UAB Emergencies, call UAB Police (UAB PD) by dialing 911 from a campus phone, or 934-3535 from a mobile phone. The UAB Emergency Department (ED) is located at 1801 6th Avenue South, Birmingham, AL 35233 For oral (mouth) exposure, or if DT has been swallowed and the person is conscious, wash out mouth with water while another worker calls UAB PD. For inhalation exposure, move person to fresh air. For contact exposure to the eye, flush eye with copious amounts of water for at least 15 minutes and call UAB Police For dermal exposure, rinse area with copious amounts of water for at least 15 minutes, remove any contaminated clothing. Call UAB PD or go directly to the Emergency Department (ED). Needlesticks are a medical emergency and all work should be halted. Another person should secure the toxin while the injured person washes and obtains treatment. Call UAB PD, or go directly to ED.

Hazardous materials and equipment
<p><i>(List items used. Include chemical name, common name and abbreviation)</i></p> <p>Diphtheria Toxin (DT)</p>

Signs and Symptoms of Exposure
<p><i>(Describe the specific signs and symptoms of an exposure to the chemical such as visual cues or</i></p>

odors)

There have been reports of rapid onset of local pain after percutaneous exposure to diphtheria toxin and such an occurrence would indicate a significant exposure. Further symptoms include: skin irritation, respiratory irritation, fever and headache. Do not breathe dust, fume or vapors of DT powder or solutions. DT may cause death if ingested. Onset of symptoms following significant diphtheria toxin exposure would typically have onset delayed by days to weeks and are due to the inhibition of protein synthesis. The Emergency Department (ED) shall assess the severity of the exposure and take appropriate actions.

Potential Hazard(s)

(Describe the potential hazards associated with the chemicals or the procedure.) Examples include:

DT is an exotoxin that inhibits eukaryotic protein synthesis by ADP-ribosylating an elongation factor needed to translocate the ribosome along mRNA. DT exposure can be extremely toxic at very low levels. All contact should be avoided.

Routes of Exposure

(Potential routes of exposure such as inhalation, injection, skin/eye contact)

Routes: Ingestion, inhalation, absorption, percutaneous

Symptoms: Skin irritation, respiratory irritation, fever and headache. Do not breathe dust, fume or vapors of DT powder or solutions. DT may cause death if ingested.

Exposure Limit

(As applicable, list the Permissible Exposure Limit (PEL) or Threshold Limit Value (TLV) of the chemical(s) if known)

LD50 = 0.1 ug/kg

Quantity/Concentration Hazards

(As applicable, describe if the quantity/concentration of the chemical(s) used increases the risk of exposure to the chemical.)

If possible do not work with powder form of diphtheria toxin (DT). If necessary purchase pre-weighed or pre-diluted DT in the least quantity possible to perform work. [Vials of DT will be purchased in pre-weighed powder form and then reconstituted in a [fume hood/glove box/biological safety cabinet (BSC)]. Weighing the toxin is not necessary as reconstitution will occur in the purchased vial and then aliquoted into vials with caps.]

Engineering Controls

(As applicable, describe the engineering controls used for the procedure) Examples:

- Use fume hoods, BSCs, or glove boxes for all toxin work
- Bench paper, pads, plastic-backed paper should be used for work surfaces inside containment devices
- Special ventilation: work areas should be under negative pressure to surrounding areas
- vacuum lines should be HEPA filtered
- Safe sharp devices: Be extremely cautious using needles with DT. Follow the written procedures for safe use of sharps, and practice doing a “dry run” with less hazardous materials as needed. A sharps container must be in the immediate vicinity for safe sharps disposal. Use a syringe holder to secure syringe. Contact Biosafety for consultation at 205-917-4766 or email biosafety@uab.edu.
- Other safety devices used: centrifuge safety cups or sealed rotors when centrifuging toxin-containing materials.

Personal Protective Equipment (PPE)

(Refer SDS or other sources/consult EH&S)

- Double Gloves (Nitrile)
- Lab Coats, Suits, Aprons (long sleeves)
- Safety Glasses, Goggles, Face shields
- N95 Respirators may be required, depending on procedure

Work Practice Controls

(As applicable, describe work practice controls used for the procedure) Examples:

- All preparation of DT will be performed over plastic backed absorbent pads.
- If possible do not work with powder form of diphtheria toxin (DT). If necessary purchase pre-weighed or pre-diluted DT in the least quantity possible to perform work. [Vials of DT will be purchased in pre-weighed powder form and then reconstituted in a [fume hood/glove box/biological safety cabinet (BSC)]. Weighing the toxin is not necessary as reconstitution will occur in the purchased vial and then aliquoted into vials with caps.]
- Vaccine is available for diphtheria, and must be offered every ten years. If persons working with DT are not current with their immunizations, contact Occupational Medicine
- Reconstitution, dilution and administration of the toxin will be performed only in a [fume hood/glove box/BSC] while wearing PPE.
- Designate specific area for toxin work

- Housekeeping: Decontamination of all work surfaces and materials after procedures are complete
- Two people should be present during high-risk procedures.
- Restricted access during work with toxins.
- Special signage: "Toxins in Use. Authorized Personnel Only"
- Hand wash
- DO NOT RECAP needles. Never leave exposed needle tip in work area.
- Animals will be anesthetized or placed into a restraining apparatus before procedures using DT are performed. Once the animal has been properly fitted into the restraining apparatus, the syringe will be loaded just prior to injection.

Monitoring

(As applicable, describe any monitoring needed for the procedure) Examples:

- N/A

Cleanup/Decontamination Procedures

(Describe the process for cleaning the work area during and after the procedure.)

Work space surfaces must be wiped down with 1% NaOCl or 10% bleach daily, during the length of the experiment. To prevent corrosion of metal surfaces rinse with water after using chlorine-based chemicals. Absorbent pads will be replaced daily. The used and contaminated absorbent pads, PPE, etc. will be placed in a biohazard bag and autoclaved. Note that some disinfecting agents may not deactivate DT.

Storage Procedures

(Describe how and where the chemical will be safely stored)

Example: Reviewing expiration dates on peroxide formers

- Unused DT will be kept in its original container or aliquoted into labeled vials that are tightly closed and stored at -20°C. The original DT container or vials containing aliquots, will be stored inside a labeled, leak-spill-proof secondary container.
- Store DT in a secure location.

Transportation Procedures

(If the chemical will be transported on campus, describe procedure)

- Transport DT in secondary, sealed, labeled non-breakable containers.

Waste Disposal Procedures

(Description of how waste will be disposed)

- Any waste DT will be chemically decontaminated or autoclaved before disposal.
- Chemical decontamination/neutralization with 1% NaOCl or 10% bleach for 30 min.
- If in-lab decontamination/autoclaving is not possible for some DT waste, it should be manifested as chemical waste.

Spills or Releases

(Provide specific instructions on what personnel should do in the event of a spill or gas release. Include location of spill kits.)

If you are not trained or comfortable cleaning up a spill, call 205-917-4766 or email biosafety@uab.edu for assistance. If it is an emergency (risk of exposure to others such as an on-going DT release) call UAB Police by dialing 911 from a campus phone or 934-3535 from a mobile phone

- **Liquid spills:** To be cleaned by properly protected and trained personnel. Personnel cleaning up a liquid spill will wear a lab coat/gown, goggles, and two pairs of nitrile gloves. Cover spill with absorbent paper towels and apply 1% sodium hypochlorite (NaOCl) (or 10% bleach), starting at the perimeter and working towards the center, allowing 30 min. contact time to deactivate DT before clean up. Clean the spill area with 1% NaOCl (or 10% bleach) allowing 30 min. contact time, then soap and water. The decontaminated spill waste will be double bagged and disposed of in regular trash.
- **Powder spills inside of [fume hood/glove box/BSC]:** To be cleaned by properly protected and trained personnel. Personnel cleaning up a powder spill will wear a lab coat/gown, goggles, and two pairs of nitrile gloves. Gently cover powder spill with dampened absorbent paper towels to avoid raising dust. Apply 1% NaOCl (or 10% bleach), starting at the perimeter and working towards the center, allowing 30 min. contact time to deactivate DT before clean up. Clean the spill area with 1% NaOCl (or 10% bleach) allowing 30 min. contact time, then soap and water. The decontaminated spill waste will be double bagged and disposed of in regular trash. Wash hands thoroughly after completing any spill clean up.
- **Powder spills outside of a [fume hood/glove box/BSC]:** Remove all personnel from the room and restrict access. A spill cleanup professional will need to manage the spill since it requires respiratory protection.

As soon as possible report the spill by notifying EH&S (EH&S business hours 205-917-4766, outside business hours call UAB PD; tell them that a spill has occurred, and you need to contact a UAB EH&S Director On Call. Be prepared to provide the following information:

Name, concentration and amount spilled	
Name and phone number of knowledgeable person that can be contacted	
Number of injured, if any	
Location of spill	

This information can also be used in reporting to the Emergency Department after potential exposures.

<p align="center">Fire</p> <p><i>(Provide specific instructions on what personnel should do in the event of a fire)</i></p> <p>N/A</p>
<p align="center">Occupational Medicine Requirements</p> <p><i>(Describe any Occupational Medicine requirements necessary that are associated with the procedure Examples include medical evaluation, and respiratory fit testing)</i></p> <p>Contact Occupational Medicine for information on DT vaccines.</p>
<p align="center">Safety Data Sheets (SDS)</p> <p><i>(Describe how personnel will access SDS in the lab. Include a copy of the SDS with this SOP)</i></p> <p>Ensure the toxin Material Safety Data Sheet/Safety Data Sheet (MSDS/SDS) is available to staff at all times</p>
<p align="center">Training Requirements</p> <p><i>(Describe what training personnel must complete before using chemical/procedure. This training should be documented)</i></p> <p>The PI is responsible for ensuring training on toxin-specific hazards and standard operating procedures (SOP) is carried out and documented for all laboratory personnel prior to the start of work. The training must include but is not limited to appropriate workplace practices and procedure-specific activities involving toxins, personal protective equipment, the health and physical hazards of the toxin, signs and symptoms associated with exposure, and emergency response procedures. All training must be documented and maintained by the PI.</p>
<p align="center">Review of Procedure</p> <p><i>(Describe the frequency for reviewing the SOP document)</i></p> <p>Per PI policies</p>
<p align="center">Protocol</p> <p>Description of how to safely perform the experiment or operation.</p>

Training Documentation	
Training Acknowledgement: I have read, asked questions, and understand the hazards of and safeworking procedures for the activity/materials described herein.	
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