

BIOLOGICAL SCIENCES LABORATORY CHEMICAL SAFETY PLAN

POSITION STATEMENT: The DBS regards Chemical Safety issues, and any issues pertaining to the safety and well being of researchers, staff, and students to be of the utmost importance. Our ultimate goal is to provide a safe working environment that complies with federal, state, and university guidelines, regulations, and laws. We strive to achieve this goal while allowing researchers to efficiently pursue their academic endeavors and responsibilities without the burdens of undue and cumbersome regulation.

A. PRINCIPLES FOR WORKING WITH LABORATORY CHEMICALS AND BIOLOGICAL MATERIALS.

This laboratory Chemical Hygiene Plan is mandatory. The procedures, personal protective equipment and other elements of this Chemical Hygiene Plan are designed to minimize exposures. All investigators, fellows, technical staff, students, or any other individuals working in the lab must comply with the precautions and rules outlined below at all times.

The following general principles apply to the use of chemicals and biological materials in this laboratory, _____ Building, Room(s) _____.

1. It is prudent to **minimize all chemical exposures**. Inhalation, ingestion and skin contact with chemical or biological materials should be avoided.
2. **Avoid underestimation of risk**. Exposures should be minimized even for substances of no known significant hazard. Special precautions should be used for work with substances that present special hazards. Assume that any mixture will be more toxic than its most toxic component and that all substances of unknown toxicity should be considered toxic.
3. **Provide adequate ventilation**. Fume hoods and other exhaust ventilation devices should be used properly to prevent exposure to airborne substances.
4. **Use available references to assess the risk of hazardous chemicals**. The Occupational Safety and Health Administration (OSHA) have provided a list of permissible exposure limits (PELs) for a number of chemicals. The American Conference of Governmental Industrial Hygienists (ACGIH) has provided threshold limit values (TLVs) for many chemicals. The Texas Tech University Chemical Hygiene Plan includes a list of Hazardous Chemicals and Select Carcinogens, which should be handled with additional precautions. Carcinogens are listed separately because special handling is required for these chemicals.

B. CHEMICAL HYGIENE RESPONSIBILITIES Responsibility for this laboratory chemical hygiene plan is assigned to the following individuals:

1. Dr. _____, **Chairman of the Department/Division of _____ is responsible for chemical hygiene in this Department/Division.**
2. Dr. _____, **as principal investigator and laboratory chemical hygiene officer, is responsible for the following:**
 - a) Develop, implement and revise this chemical hygiene plan, policies and practices as is needed for the individual lab. Maintain an awareness of current requirements concerning regulated substances.
 - b) New incoming graduate students will undergo a 1-day mandatory training session as part of their DBS orientation. During this training all students will be taught general lab safety procedures as outlined in this operating policy.
 - c) All undergraduate students engaged in research in DBS' labs will also be required to have read and understood this operating policy before engaging in research activities.
 - d) Ensure that all individuals within a lab have undergone required yearly training as mandated by EHS. These include but are not restricted to; Lab Safety, Safety Awareness, Hazard Communication and Biological Safety. These safety courses are online at: <http://www.dept.ehs.ttu.edu/ehs/ehshome/training> and training certificates are to be printed and kept in the Laboratory Safety Manual.
 - e) Monitor purchasing, use, and disposal of chemicals and biological materials used in these laboratories.
 - f) Ensure appropriate records are maintained (training, audit reports, injury reports, etc.).
 - g) Ensure that faculty, staff, and students understand and follow the Chemical Hygiene Plan.
 - h) Provide regular formal laboratory hygiene and housekeeping inspections, including routine inspections of any emergency equipment required by the Chemical Hygiene Plan for this laboratory.
 - i) Determine the required or appropriate levels of protective apparel and equipment. Make sure protective equipment is available, in working order, and used properly. Provide adequate training for the use of protective equipment.
 - j) Ensure that facilities and training for use of any new materials being ordered are adequate.
 - k) Seek ways to improve laboratory safety.
3. **Fellows, students, and laboratory staff are responsible for:**
 - a) Planning and conducting each experiment in accordance with the laboratory Chemical Hygiene Plan and all applicable University policies and procedures.
 - b) Developing and practicing good personal hygiene and chemical and biological safety practices.
 - c) Review procedures for substituting a less or non-hazardous procedure which will produce the same results.

- d) Consider procedures to implement a smaller scale operation or experiment when possible.
- e) Implement inventory control by evaluating if a smaller quantity of chemical(s) may be purchased.
- f) Educate others in the same working area on the safe and proper purchase, use, storage, and disposal of hazardous materials within the Department of Biological Sciences and Texas Tech University.
- g) Accurately label all containers in the work area.
- h) Conduct periodic inspections of potential waste generating operations under your direct control.
- i) Contact Environmental Health and Safety when hazardous materials need to be collected. Do not accumulate large quantities of unnecessary hazardous materials. See Material Handling and Disposal below for details on preparing materials for collection

4. **Environmental Health and Safety (EHS):**

- a) Provide a timely collection service for hazardous materials that are no longer needed.
- b) Maintain a Hazardous Waste Management Program that emphasizes source reduction.
- c) Arrange for final disposal of hazardous wastes.
- d) Complete all required regulatory reporting.
- e) Act as the University representative for contract agreement, shipment record keeping, and regulatory inspections involving hazardous materials.
- f) Provide information and technical assistance regarding proper purchasing, storage, labeling, and disposal of hazardous materials.
- g) Act as a collection point for individuals who have ideas for improving the Hazardous Waste Management Program.

C. THE LABORATORY FACILITY

1. **Design:** All laboratories are designed in accordance with accepted laboratory standards. No room shall be converted into a laboratory for the use of chemical or biological materials until it is reviewed by Environmental Health & Safety.
2. **Chemical Storage:** All Chemicals are to be stored according to OSHA regulations:
 - a) All Chemicals are to be stored with labels intact.
 - b) General use chemicals are to be stored separately from chemicals determined to be a health hazard. In addition, within categories, solid chemicals should be stored separately from liquids.
 - c) General usage chemicals should be labeled with an easily visible orange sticker.
 - d) Health Hazard chemicals should be labeled with and easily visible blue sticker.
 - e) MSDS sheets are to be kept electronically or within a binder for chemicals with an NFPA number of 2 or less for any category. Any chemical with a 3 or above for any category will be addressed in a separate Biological Sciences Operating Plan for hazardous chemicals.

- f) All chemicals will be barcoded prior to delivery and a chemical inventory will be maintained for all chemicals within a lab. Chemicals will be designated by chemical name, ACS number, NFPA number and location with the lab. Chemical Inventories can be accessed at: <http://www.dept.ehs.ttu.edu/ehs/ehshome/labsafety>. Barcodes from emptied containers, must be placed on a Barcode Return Sheet (Appendix F) and returned to EHS as directed on the form.
- g) Commonly used buffers and solutions that are made and stored within the lab will be labeled with the common name and if non-hazardous labeled with a visible orange dot.
- h) An inventory of commonly used buffers will be maintained (ie PBS: Phosphate Buffered Saline) and will be designated by NFPA number and location within the lab.
- i) According to EHS regulations, acids, bases and flammable liquids will be stored in specified, regulated and clearly labeled containers.



D. CHEMICAL INVENTORY GUIDELINES FOR LABORATORIES

1. **Purpose:** In order to comply with numerous regulatory requirements, the University must compile an annual inventory identifying the location (building and room) and

quantity of all hazardous materials on campus. One of the major regulatory elements the inventory is used to fulfill is the OSHA Hazard Communication Regulation - 1910.1200 (HazCom). The purpose of HazCom is to ensure that the hazards of chemicals produced or imported are evaluated, and that information concerning their hazards is transmitted to employers and employees. In addition to the OSHA regulations for hazard communication, there are other regulations and guidelines, which require an inventory system.

- a) Environmental Protection Agency (EPA) – Emergency Planning and Community Right-to-Know Act (EPCRA) hazardous chemical storage reporting
- b) Department of Homeland Security (DHS) – Chemicals of Interest (COI)
- c) Centers for Disease Control and Prevention (CDC) – Select agents and toxins
- d) Drug Enforcement Agency (DEA) and Bureau of Narcotics and Dangerous Drugs (BNDD) – Controlled Substances and List I & II regulated chemicals
- e) International Building Code - Flammable material and other storage limits
- f) Local Fire Department Requirements – Flammable material storage limits

2. **Compliance:** In order to achieve and maintain compliance, the Department of Biological Sciences at Texas Tech has committed to inventorying chemical containers on site as described below in "Items REQUIRED to be Inventoried," except those exempted below under "Items NOT REQUIRED to be Inventoried".

Initially, all labs will have to comply by manually inventorying all required material items mentioned in the "Items REQUIRED to be Inventoried" below

On an annual basis, each lab will be responsible for verifying that the items in the inventory match what is currently found in the lab and other storage areas, such as common areas, refrigerators/cold rooms, and freezers. However, there are other materials, which are highly regulated and may require more frequent inventory updates. These materials are items of interest to federal and local agencies, such as Department of Homeland Security, Centers for Disease Control and Prevention, Local Fire Department, etc. and are more controlled to prevent the following:

- a) Release: quantities of toxic, flammable, or explosive chemicals that have the potential to create significant adverse consequences for human life or health if intentionally or unintentionally released, detonated, or involved in a fire.
- b) Theft or Diversion: materials that have the potential, if stolen or diverted, to be abused or used as weapons, which can ultimately lead to significant adverse consequences for human life or health.
- c) Sabotage or Contamination: chemicals that, if mixed with other readily available materials, have the potential to create significant adverse consequences for human health or life.

Since most of these materials have well established threshold limits which are defined by each agency, EH&S will be assisting with the compliance requirements by performing monthly database queries for labs located within designated control areas, floors, or buildings. Keeping in mind that these are aggregate amounts, if a lab, control area, floor, or building is over the threshold limit, then EH&S will work with all labs within the area to resolve any issues with database information or actual materials stocks

3. Items REQUIRED to be Inventoried: Any, but not limited to, chemical containers that have a manufacture's label which denotes physical or health hazards, or whose MSDS denotes hazards, are to be included in the inventory. In general, laboratory chemicals and reagents are inventoried even if the hazard is considered low. Almost all chemicals received from chemical manufacturers such as Sigma-Aldrich, Fluka, Alfa Aesar, Fisher Scientific, Mallinckrodt Baker, Acros, Bio-Rad, Qiagen, Invitrogen, etc., will be included in the lab inventory. The list below provides some examples of common materials that need to be inventoried.

- a) Environmental Health and Safety Listed Chemicals
http://www.depts.ttu.edu/ehs/Web/Docs/Chem_Hygiene_Plan.pdf
 - b) DEA scheduled materials, to include those materials acquired from the Division of Comparative Medicine (DCM) <http://www.justice.gov/dea/pubs/scheduling.html>
 - c) Select agents that are classified as biological toxins (Appendix C)
 - d) All flammable solvents, to include primary & secondary chemical containers that are brought into the lab from another location (e.g.) 10 gallon carboy of ethanol that is filled from a primary 55 gallon drum at the loading dock and brought into the lab
 - e) Materials that are transferred or inherited from another lab
 - f) All organic solvents, including liquid scintillation counting cocktail
 - g) Other research drugs and therapeutics
 - h) All chemicals/reagents regardless of hazard
 - i) Shock sensitive and potentially explosive mixtures produced by the lab must be inventoried (e.g. Bouin's stain made from saturated picric acid solution or serial dilution of ether mixtures). For further guidance in peroxide forming materials and shock sensitive materials see Appendix D.
 - a. Reactive or **explosive** materials requiring special attention
 - b. Guidelines for Safe Handling and Disposal of Peroxide Forming
 - j) Gas cylinders, small compressed gas cylinders or small propane cylinders
 - k) Corrosive cleaning agents (e.g. strong base/acid solutions, RNASE away, Chromerge, etc.)
 - l) Photographic Chemicals
 - m) Activated charcoal
 - n) Chemical kits**
 - o) Dyes and stains
- ** Chemicals contained in a kit are usually not individually inventoried. They can be inventoried under the kit name.

4. Items NOT REQUIRED to be Inventoried: Even though some items may not be entered into the inventory, the user is still responsible to obtain a current MSDS for the product. The list below provides some examples of common materials that do not need to be inventoried.

- a) Any secondary chemical container that is produced in the lab from a primary chemical container(s) that is already inventoried (e.g.)
 - i. 1N NaOH that is made from a commercially available 10N NaOH solution or solid NaOH.
- b) Squirt bottles and spray bottle

- c) Conical and “Falcon” tubes with chemicals or samples in them
- d) Biological material (e.g.) o plant or animal tissue, blood or blood products
- e) reproducing biological organisms, bacteria, viruses, fungi or yeast
- f) Enzymes, antibodies, proteins, peptides, nucleic acids
- g) Conjugated antibodies and proteins
- h) Tissue culture media or other growth media
- i) Buffer solutions for pH probes
- j) Non-chemical diagnostic materials that contain a film on any surface (e.g. 96-well plate)
- k) Chemical spill kits
- l) First aid kit components
- m) Food or food additives (unless it will be used for R&D or operational purposes)
- n) Office Supplies (appropriate quantities for office administrative purposes)
- o) Non-Hazardous metals such as foils, bars, and rods
- p) Test strips (pH, peroxide, water hardness, iron, phosphate, etc.)

Note: Each PI or designated person(s) will be responsible for the proper hazard determination (see below) for all mixtures that are commonly made and used in the research lab. For hazard classification guidance concerning mixtures and solutions, the Hazard Communication Standard (29 CFR 1910.1200) states that a mixture (or solution) will be considered as having the same health hazards as the components that comprise $\geq 10\%$ of the mixture ($\geq 0.1\%$ for known carcinogens in the mixture). If the PI or designated person(s) is not comfortable with making hazard determinations or is unsure about the hazard classification of a particular solution, they should consult with EH&S.

E. COMPONENTS OF THE LABORATORY CHEMICAL HYGIENE PLAN

Basic rules and procedures. **All labs must post on the inside of any laboratory door a list of contacts at Texas Tech University (Appendix B) as well as General Laboratory Rules (Appendix C)**

All issues: Notify your supervisor.

If required: Call the employer’s occupational medicine provider to arrange a post-exposure evaluation.

The following general principles should be used for all laboratory work with chemicals:

1.

- a) Accidents and spills
 - Eye contact: Promptly flush eyes with water for 15 min and call:
 - a. TechPolice (742---3931)
 - b. EHS (742---3328)
 - Ingestion: Follow directions for accidental ingestion found on the chemical’s Material Safety Data Sheet (MSDS) and call (806):
 - a. TechPolice (742---3931)
 - b. EHS (742---3328)
 - c. TTHSCUMC (775---8200)

d. Poison Control (296---8900)

Skin contact: Promptly flush the affected area with water and remove any contaminated clothing. Notify:

- a. Tech Police (742---3931)
- b. EHS (742---3328)

Spills: Call for emergency spill response:

- a. Tech Police (742---3931)
- b. EHS (742---3328)

Cuts or Breakage of Skin: Promptly flush the affected area with water and call:

- a. Tech Police (742---3931)
- b. EHS (742---3328)

All issues: Notify your supervisor.

If required: Call the employer's occupational medicine provider to arrange a post-exposure evaluation.

- b) Avoidance of routine exposure: Develop and practice safe habits that avoid unnecessary exposure to chemicals by any route.
 - a. Do not deliberately smell or taste chemicals.
 - b. Vent any apparatus that may discharge toxic chemicals (e.g. vacuum pumps, distillation columns, etc.) into local exhaust devices.
 - c. Inspect gloves and test glove boxes before use.
 - d. Do not allow volatile hazardous substances or asphyxiants to be released in cold rooms or warm rooms since these have contained, recirculated atmospheres.
- c) Choice of chemicals
 - a. Use only those chemicals for which appropriate ventilation systems are available.
 - b. Whenever possible, choose the least hazardous chemical for a given experiment.
 - c. Order the smallest amount of chemical necessary.
- d) Eating, drinking, smoking, etc.:
 - a. Eating, drinking, smoking, handling contact lenses and applying cosmetics is strictly prohibited in areas where hazardous laboratory chemical, biological, or radioactive materials are used or stored.
 - b. Storage of food and beverage in containers or in areas that are designated or are used for storage of hazardous laboratory materials is prohibited.
 - c. Such activities are permitted in an area (defined as a room with floor to ceiling walls and a closed door) separated from the laboratory space. If a separate area can only be accessed by going through the laboratory, then only covered food or beverages may be carried through the laboratory.
 - d. For more details on eating, drinking, etc. in the laboratory, please see the "Eating, Drinking, and Related Activities" policy on the EHS website: <http://www.depts.ttu.edu/ehs/Web/>
- e) Equipment and glassware
 - a. Handle and store laboratory glassware with care to avoid damage.

- b. Inspect glassware before each use and do not use damaged glassware.
- c. Use extra care with dewar flasks and other evacuated glass apparatus. If plastic or plastic-coated flasks are not available, shield or wrap glass flasks to contain chemicals and fragments should implosion occur.
- f) Exiting
 - a. Thoroughly wash hands and any areas of exposed skin before leaving the laboratory.
- g) Horseplay
 - a. Avoid practical jokes or other behavior that might confuse, startle or distract another worker.
- h) Mouth suction
 - a. Never use mouth suction for pipetting or starting a siphon.
- i) Personal apparel
 - a. Confine long hair and loose clothing. Wear appropriate shoes at all times in the laboratory. Clogs, sandals, perforated or cloth shoes are not appropriate.
 - b. Clothing must provide adequate coverage so that there is no skin exposed to hazardous materials.
- j) Personal housekeeping
 - a. Keep the work area clean and uncluttered, with chemicals and equipment properly labeled and stored.
 - b. Clean up the work area on completion of an operation or at the end of each day.
- k) Personal protection
 - a. Ensure that all persons, including visitors, wear appropriate personal protective equipment (PPE) in areas where chemicals and biological agents are handled.
 - b. Wear appropriate gloves when the potential for contact with hazardous materials exists. Inspect the gloves before each use and replace them periodically or when damaged.
 - c. Use low protein, non-powdered latex gloves to help reduce the risk of latex allergies. Contact Employee Health if any lab personnel have an allergic reaction to latex gloves (775-8200).
 - d. Always use appropriate containment equipment (e.g. fume hood) when working with toxic or volatile hazardous materials.
 - e. Use of respiratory protection requires enrollment in the respiratory protection program, including a medical evaluation and fit test. Contact Environmental Health & Safety if you need to wear respiratory protection (742-3876)
 - f. Use appropriate eye protection when handling chemicals ie weighing and pouring of stock chemicals.
 - g. Avoid use of contact lenses in the laboratory unless necessary. If contact lenses are worn, chemical splash goggles are required when handling chemicals. Supervisors should be aware of any personnel who wear contact lenses.
 - h. Remove laboratory coats immediately upon significant contamination and before exiting the laboratory.

- i. Employees must not take lab coats or other protective clothing home for cleaning.
- j. Use other specialized containment or personal protective equipment as appropriate.
- l) Planning
 - a. Seek information and advice about hazards before starting an experiment.
 - b. Plan appropriate protective procedures and positioning of equipment before beginning and new operation.
- m) Unattended operations
 - a. Leave lights on, place an appropriate sign on the door and provide for containment of toxic substances in the event of utility service failure (e.g. cooling water) during an unattended operation.
- n) Use of a fume hood
 - a. Use the fume hood for operations that might result in release of toxic chemical vapors or dusts.
 - b. Use a fume hood or other local ventilation device when working with any appreciably volatile substance with a TLV or PEL of less than 50 ppm.
 - c. Confirm that the fume hood is functioning properly before use. Keep the fume hood sash closed at all times except when operations within the fume hood are ongoing.
 - d. Keep storage within the fume hood to a minimum. Do not allow items to block vents airflow within the fume hood.
 - e. Work at least six inches back from the face of the fume hood.
 - f. If the fume hood is equipped with an on/off switch it should be left on at all times, even when not in use.
- o) Vigilance
 - a. Be alert to unsafe conditions and see that they are corrected.
 - b. Notify your supervisor and TTUPD (742-3931) of any suspicious activities in or around research labs.
- p) Waste disposal
 - a. Ensure that the plan for each laboratory operation includes training and procedures for disposal of waste in accordance with all federal, state, and local regulations and all applicable Environmental Health & Safety policies. These will be discussed below.
 - b. Do not dispose of any hazardous chemicals into the general trash or in the sanitary sewer.
- q) Working alone
 - a. Avoid working alone in a building.
 - b. Do not work alone in a laboratory when working with hazardous materials.

F. HAZARDOUS CHEMICAL USAGE

1. **Introduction:** This guide outlines procedures established for the safe and proper management of hazardous chemical materials located within the Department of Biological Sciences at Texas Tech University. These procedures are intended to promote compliance with federal, state, and local regulations pertaining to hazardous

materials. In addition, this guide provides instructions for handling materials that may not be considered hazardous, but have special processing or waste management requirements (See Appendix G).

2. **Definition:** Any chemical that poses a hazard to health, property or to the environment. The Chemical Operating Policy of the Department of Biological Sciences at Texas Tech University categorizes any chemical to be hazardous that is designated with a rating of 3 or above related to the NFPA 704 standard for Health, Flammability, Reactivity or Special.

3. Transportation of Hazardous Chemicals

- a) All hazardous material shall be transported within secondary containment of sufficient size to hold the entire contents in the event of a spill or leak.
- b) Large volumes or numerous bottles should be transported on carts. Carts used for transporting hazardous materials should have sides of sufficient height to restrain containers on the cart. The wheels of the cart should be of adequate diameter to assure smooth travel throughout the route of transport.
- c) At no time shall hazardous materials be left unattended during transport.
- d) Hazardous materials must not be left unattended outside any hazardous material collection location.
- e) Routes of transport for hazardous materials shall be planned to minimize exposure to personnel and patients in the event of a spill.
- f) Those transporting hazardous materials should use the freight elevators. If passenger elevators must be used to transport hazardous materials, only empty elevators are to be boarded. Passengers attempting to use the elevator shall be requested to wait for another elevator.
- g) In the event of a spill of hazardous material, The Texas Tech procedure for spills found in this policy is to be followed.

4. Storage of Hazardous Chemicals

- a) All chemicals should be dated when received and again when opened.
- b) Flammable materials in containers larger than one gallon shall be stored in approved flammable material storage cabinets. See HSE 402: Policy on Use and Storage of Flammable Materials.
- c) Peroxide forming compounds (e.g, ether, dioxane, THF) shall be disposed of six months after opening, before the manufacturer's expiration date, or, given the absence of a date, one year after receipt.
- d) Acids and bases shall not be stored with flammable materials in flammable cabinets. Acids should be segregated from bases.
- e) Incompatible chemicals shall not be stored together. For further information on chemical incompatibilities call EHS 5-5918.
- f) Stored chemicals should be evaluated annually to determine suitability and integrity for continued use.
- g) Chemicals that have been stored for 10 years should be sent for disposal via Texas Tech EHS.
- h) A sufficient supply of absorbents and neutralizers should be available at all chemical storage location for use in the event of a spill.

5. Use of Hazardous Chemical Materials

- a) When working with a hazardous Chemical material, work practices as directed by

the MSDS should be followed.

- b) Volatile chemicals with an OSHA Permissible Exposure Level (PEL) of 50 ppm or less should be handled within a chemical fume hood.
- c) A sufficient supply of absorbents and neutralizers should be available for use in the event of a spill.
- d) For any chemical rated as hazardous by the above definition will require individual training by the PI prior to usage by any member of the laboratory.
 - a. The Principal Investigator is responsible for establishing written protocols that utilize hazardous chemicals.
 - b. A written protocol must be made available by the Principal Investigator to any lab member who will be using the hazardous chemical during the procedure/assay.
 - c. The protocol must be read and understood by any user of the hazardous chemical.
 - d. The user of the hazardous chemical must sign and date that he/she has been specifically trained in the usage of this hazardous chemical and understand the hazards of its usage.
 - e. A MSDS sheet for each hazardous chemical used within any given protocol must also be included with the protocol.
 - f. See Appendix H for examples.

6. Working with Allergens and Embryotoxins/Reproductive Hazard

- a) Allergens (examples: diazomethane, isocyanates, bichromates, methyl methacrylate)
 - a. Wear suitable gloves to prevent hand contact with allergens or substances of unknown allergenicity.
- b) Embryotoxins/Reproductive Hazards (examples: organomercurials, lead compounds, formamide).
 - a. If you are a woman of child-bearing age, handle these substances only in a properly functioning fume hood while wearing appropriate personal protective equipment (especially gloves) to prevent skin contact.
 - b. Review each use of these materials with the principal investigator or research supervisor and review continuing uses annually or whenever a procedural change is made.
 - c. Store these substances, properly labeled, in an adequately ventilated area in a break-resistant secondary container.
 - d. Notify supervisors of all incidents, exposures, or spills and follow the posted Injury/Illness procedures

7. Working with Chemicals of Moderate Chronic or High Acute Toxicity (examples: diisopropylfluorophosphate, hydrofluoric acid and hydrogen cyanide) Supplemental rules to be followed in addition to those listed above:

- a) Aim: to minimize exposure to these toxic substances by any route using all reasonable precautions.
- b) Applicability: These precautions are appropriate for substances with moderate chronic or high acute toxicity when used in significant quantities.
- c) Location: Store and use these substances only in areas of restricted access with special warning signs.

- d) Containment equipment: Always use a properly functioning fume hood or other containment device for procedures that may result in the generation of aerosols or vapors containing the substance. Trap any released vapors to prevent their discharge with the hood exhaust.
 - e) Personal protection: Always avoid skin contact by using gloves and long sleeves (and other protective apparel as appropriate). Always wash hands and any exposed skin immediately after working with these materials.
 - f) Records: Maintain records of the amounts of these materials on hand, amounts used, and the names of the workers involved.
 - g) Prevention of spills and accidents:
 - a. Plan in advance how to avoid and handle spills and accidents.
 - a. Ensure that at least two people are present at all times if a compound in use is highly toxic or of unknown toxicity.
 - b. Store breakable containers of these substances in chemically resistant trays. Work with and mount apparatus above such trays or cover work and storage surfaces with removable, absorbent plastic-backed paper.
 - h) Waste: Thoroughly decontaminate or dispose of contaminated clothing or shoes. Store contaminated waste in closed, suitably labeled, impervious containers.
8. **Work with Chemicals of High Chronic Toxicity** (examples: dimethylmercury and nickel carbonyl, benzo-a-pyrene, N-nitrosodiethylamine, known human carcinogens). i. Further supplemental rules to be followed in addition to all those mentioned above for work with substances of known high chronic toxicity (in quantities above a few milligrams, depending on the substance):
- a) Access: Conduct all transfers and work with these substances in a controlled area such as a restricted access fume hood, glove box, or portion of the lab designated for use of highly toxic substances. All people with access to this area must be aware of the substances being used and understand and follow all necessary precautions.
 - b) Approvals: Prepare a plan for use and disposal of these materials and obtain the approval of the PI (or designee) and EH&S (if necessary) prior to ordering the material.
 - c) Non-contamination/Decontamination: Protect vacuum pumps against contamination with scrubbers or HEPA filters and vent them into a hood. Decontaminate vacuum pumps or other contaminated equipment, including glassware, in the controlled area before normal work is resumed there.
 - d) Exiting: On leaving a controlled area, remove any protective apparel (placing it in an appropriate labeled container) and thoroughly wash hands and any other areas of exposed skin.
 - e) Housekeeping: Use a wet mop or a vacuum cleaner equipped with a HEPA filter instead of dry sweeping if the toxic substance is a powder.
 - f) Medical surveillance: If using toxicologically significant amounts of these substances on a regular basis (e.g. three times per week), consult the chemical hygiene officer, EH&S, and a qualified physician concerning advisability of regular medical surveillance.
 - g) Records: Keep accurate records of the amounts of these substances stored and used along with the dates and names of users.

- h) Signs and labels: Ensure that the controlled area is conspicuously marked with warning and restricted access signs and that all containers of these substances are appropriately labeled with the chemical identity and warning labels.
- i) Spills: Ensure that contingency plans are in place and that equipment and materials are readily available to minimize exposures of people and property in case of an accident.
- j) Storage: Store containers of these chemicals only in a ventilated, limited access area in appropriately labeled, break-resistant, chemically resistant secondary containers.
- k) Gloves boxes: For a negative pressure glove box, the ventilation rate must be at least two volume changes per hour and the pressure must be at least 0.5 inches of water. For a positive pressure glove box, thoroughly check for leaks before each use. In either case, trap the exit gases or filter them through an appropriate filter before releasing them into the hood.
- l) Waste: Use chemical decontamination whenever allowable. Ensure that containers of contaminated waste (including rinsates from contaminated flasks) are transferred from the controlled area in a secondary container under the supervision of authorized personnel.

9. Excess Hazardous Chemicals

- a) The contents of all containers must be clearly identified.
- b) Toxic, highly reactive or corrosive chemicals should be collected in compatible containers and labeled with all contents clearly identified.
- c) All chemicals should be collected for disposal in a container of the same material as that in which they were delivered, or in an approved safety can for flammable liquids.
- d) Individual chemicals (or reagents containing hazardous chemicals) should not be mixed for disposal.
- e) Whenever possible, different types of excess flammable liquid should be collected separately.
- f) Corrosives (or solutions containing corrosives) should be collected in glass or chemical resistant plastic containers.
- g) Mixtures of flammable liquids and corrosive chemicals should be collected separately and should not be collected in metal containers.



10. Disposal of Hazardous Materials

- a) Excess hazardous material must be disposed of in accordance with Federal and State guidelines. Unwanted chemicals must be disposed through the Texas Tech Hazardous Material Disposal Program (Appendix H)
- b) Materials in any of the following categories must be disposed of as hazardous materials:
 - a. Ignitable - any substance with a flash point below 60°C (140° F).
 - b. Corrosive - any substance with pH of less than or equal to 2.0 or greater than or equal to 12.5.
 - c. Reactive - any substance which is unstable, reacts violently with water, forms potentially explosive mixtures with water, generates toxic gases, vapors or fumes when mixed with water or exposed to a pH between 2.0 and 12.5, or capable of detonation or explosive decomposition or reaction.
 - d. Toxic - any substance which contains any of the compounds listed by the EPA under the Resource Conservation and Recovery Act at or greater than the listed concentration.
 - e. Specific chemicals - any substance containing an EPA listed compound.
- c) All containers of excess chemicals must contain the following information.
 - a. Specific chemical name (in English). If a mixture, list the components and percentage composition. Non--- specific identifiers (i.e mixed solvents, mixed aqueous solutions) will be treated as Unknowns (See Section F below)
 - b. Contact name (Principal Investigator or their designee).
 - c. Location of lab (Building/room number)
 - d. Lab phone number
- d) All unwanted/excess materials must be inventoried and submitted to EHS prior to disposal via the EHS On-line Chemical Waste Form.
<http://www.depts.ttu.edu/ehs/Web/WPRequestForms.aspx>

11. Employee Protection

- a) When working with a hazardous material the minimum personal protective equipment shall be:
 - a. lab coat or other protective clothing
 - b. safety glasses or splash goggles
 - c. gloves
- b) Personal protective equipment shall not be worn outside the lab or work area.
- c) EHS may require modifications to the work area or personal protective equipment to assure protection of personnel. Personal protective equipment may include gloves, eye protection, protective clothing, and/or respiratory protection. All personnel requiring respiratory protection will be enrolled in the Texas Tech Respiratory Protection Program managed by EHS.

12. Procedures

- a) Chemical Spill Procedure
- b) EVALUATE THE SPILL
 - a. Are the materials Innocuous, Corrosive, Flammable, Toxic or Explosive?
 - b. Identify all materials by common or chemical name.
 - c. Estimate how much is spilled.
 - d. Evaluate the degree of danger to patients, staff or visitors.
 - e. Evaluate the degree of danger to equipment or property.
- c) CONTAIN THE SPILL. Utilize any action designed to prevent the spilled material from spreading and causing increased damage.
- d) EVACUATE the area if the spill cannot be contained, OR if the spilled material produces irritating odors, flammable vapors or explosive vapors. (extinguish all spark or ignition sources).
- e) CLEAN up the spilled material.
 - a. Spills of innocuous material can be cleaned up by laboratory personnel or equipped staff.
 - b. Spills of acids, bases and flammables and mercury can be cleaned up by laboratory personnel using appropriate neutralizers/absorbents and proper personal protective equipment.
 - c. Spills of toxic or explosive material, and large spills of corrosive or flammable materials shall be handled by EHS. Immediately call the Emergency Telephone Number for your campus: EHS 742 -3328, Tech Police (742-3931)
 - i. Your name and phone number.
 - ii. Precise location of spill.
 - iii. Exact description of what was spilled (make sure you state any compounds which may form toxic compounds).
 - iv. Any steps you have taken to control the spill.
 - v. Any injuries that have occurred.
- f) DISPOSE of all contaminated materials in accordance with this Policy.
- g) Employees who have been exposed to hazardous chemicals due to a spill or other uncontrolled situation shall promptly report to the Occupational Injury Clinic for their campus or to an Adult Emergency Room when the Clinic is not operating. A Report of Incident shall be completed by the individual's supervisor.
- h) Consult EHS at 742-3876 with any question regarding chemical spills and spill clean up.

APPENDIX A

STORAGE AND HANDLING OF PEROXIDE FORMING CHEMICALS

Materials that are susceptible to peroxide formation are ones that typically react with air, moisture or impurities and produce a change in their chemical composition in normal storage. Certain organic solvents are susceptible to peroxide formation and can form potentially explosive peroxides over time. Unless these materials are properly handled they can pose a serious safety hazard to users and a difficult disposal problem to the Environmental Health and Safety Office.

Peroxide forming chemicals are divided into three classes as follows:

Class A: Chemicals that form explosive levels of peroxides without concentration. These are the most hazardous and can form explosive peroxide levels even if not opened.

Divinyl Acetylene	Divinyl Ether	Isopropyl Ether
Sodium or Potassium Amide	Vinylidene Chloride	

Class B: Chemicals that form explosive levels of peroxides when concentrated through distillation evaporation or exposure to air after opening.

Acetal	Cumene	Dioxane
Cyclohexene	Cyclopentene	Dicyclopentadiene
Diethyl Ether	Tetrahydrofuran	Methyl Isobutyl Ketone
Ethyl Vinyl Ether	Methyl Acetylene *	Furan
Diacetylene *	Methyl Cyclopentane	Tetrahydronaphthalene
Glyme (ethylene glycol dimethyl ether)		

Class C: Chemicals which are a hazard due to peroxide initiation of polymerization.

Butadiene	Chlorobutadiene	Chlorotrifluoroethylene *
Acrylonitrile	Vinyl Acetate	Vinyl Acetylene*
Vinyl Chloride*	Vinyl Pyridine	Tetrafluoroethylene*
Styrene	Methyl Methacrylate	

* Gas

General Precautions for Storage and Handling of Peroxide Forming Chemicals

Minimize the quantity of peroxides or peroxide forming chemicals in the lab.

Know the properties and hazards of all chemicals you are using through adequate research and study, including reading the label and MSDS.

Label each container with the Date Received, Date Opened and Date Last Tested.

Methyl Ethyl Ketone Peroxide	Colorless liquid; strong oxidizer
Nitroglycerin	Colorless liquid
Nitromethane	Colorless liquid; highly flammable, incompatible with Amines, oxidizers, strong acids or bases.
Picramide + (syn. Trinitroaniline)	Yellow crystalline solid; requires >30 % water
Picric Acid + (syn. Trinitrophenol)	Yellow crystalline solid; requires >30% water Incompatible with metals, oxidizers or reducers.
Picryl Chloride	White crystalline solid; requires >30% water Incompatible with oxidizers, inorganic nitrates
Picryl Sulfonic Acid + (syn. Trinitrobenzenesulfonic acid) Trinitroanisole (syn. Methyl Picrate)	Flammable solid, corrosive; requires >30% water
Trinitrobenzene +	Yellow crystalline solid; requires >30% water
Trinitrobenzoic Acid	
Trinitrotoluene+	
Urea Nitrate +	Colorless crystalline solid; requires >10% water

+ These items require EHS approval to purchase.

PEROXIDE FORMING CHEMICAL

Date Received _____ Date Opened _____

Date/Test Results _____

Date/Test Results _____

Date/Test Results _____

Date/Test Results _____

Date/Test Results _____

EXAMPLE

PEROXIDE FORMING CHEMICAL

Date Received 9/16/15 Date Opened 9/26/15

Date/Test Results 9/26/15 10 PPM

Date/Test Results 12/26/15 10 PPM

Date/Test Results 3/25/16 30 PPM

Date/Test Results 6/25/16 100 PPM

In the above example the chemical was a Class A peroxide forming chemical. It had a manufacturer's expiration date of 11/15/16.

The chemical was opened within the allowable unopened storage time. The initial test after opening was satisfactory. Subsequent tests every three months were satisfactory until the test on 6/25/16. As this test result is >80 ppm. The chemical must be disposed of as soon as possible.

ADDITIONAL INFORMATION

Peroxide Forming Chemical Labels are available from EHSO

Peroxide Test Strips are available from the following sources.

University of Hawaii at Manoa Chemistry Department Stockroom, Bilger 116

Phone: 956---6021

Hawaii Chemical and Scientific 2363 N. King St. Honolulu, HI, 96819

Phone: 841---4265

Laboratory Safety and Supply (800) 356---0783 Online at www.labsafety.com

APPENDIX B

PI: Name
Lab Address
Lab Number
Emergency Contact Number

Emergency 9-911

Ambulance, Fire, Police

University Medical Center (UMC)

(806) 775-8200

Texas Tech Police

Non-emergency (806) 742-3931

Building Contacts

Ron Chesser, Chair, Department of Biological Sciences

Office: Biology 108 Phone: (806) 834-0121

Other: Biology 108 Phone: (806)834-0026

Christopher Long, Building Manager

Office: Biology 111 Phone: (806) 834-4366

Other: (806) 789-5417

Lab Safety Coordinator

Ruth Serra-Moreno: Office: ESB 113; Phone: (806) 834-0357

Environmental Health and Safety

Phone: (806)742-3876

Physical Plant

Maintenance Emergencies (806) 742-3301 or after 5pm (806) 742-3328

Information Technology

(806) 742-HELP or for Server-related issues (806) 742-3649

Texas Department of Public Safety

(806) 472-2700

TTU Emergency Management Coordinator University Council: Ronald Phillips

(806) 742-2121

TTU Emergency Management Coordinator Executive Director of Public Safety and

Emergency Management: Jay Parchman

(806) 742-9000

The Office of Communications and Marketing maintains the **Emergency Communications Center**

41 Administration Building

Lubbock, TX 79409

806.742.2136

806.742.1615 fax

Normal Office Hours: 8 a.m. – 5 p.m. Central, Monday – Friday

APPENDIX C

Mandatory Laboratory Safety Rules:

1. Comply with emergency evacuation procedures.
2. Access to eyewashes, safety showers, and fire extinguishers must be kept clear.
3. Eating and drinking in the laboratories and animal rooms is strictly forbidden at all times.
4. Eye protection must be worn at all times in the laboratories where chemicals are used and where there is the potential for eye injury.
5. Open-toed shoes, sandals, nor shorts, are acceptable in laboratories or animal rooms.
6. Keep the Chemical Hygiene Plan, MSDS's, and emergency phone numbers in a highly visible location in the lab.
7. Immediately report any work related illness or injury to your supervisor and the safety coordinator.
8. Tasks that present unusual hazards must be reviewed with the appropriate supervisor before they are conducted.
9. Labels on containers must not be defaced, and all containers of chemicals must be labeled, listing the contents, hazards, name of owner, date received, and date opened.
10. Dispose of all expired chemicals per annual inventory of the lab. Contact EH&S for all waste chemical disposals at 2-3876.
11. When working with carcinogens, mutagens, or teratogens, comply with all safety procedures.
12. Pipetting by mouth is strictly forbidden.
13. Gas cylinders must be firmly secured with restraints whether in use or stored. Regulators must be removed and caps used when moving cylinders.
14. Do not modify electrical equipment yourself. The electrical shop will modify or fix electrical equipment for your SAFETY.
15. Lab must contain a first aid kit and its location must be known by lab members.
16. Emergency phone numbers should be posted within laboratory and on the outside of the laboratory door (i.e. 9-911, EH&S number 2-3876, Poison Control Center, Principal Investigator's office and home phone numbers, and other employees' or students' home phone numbers).

Exposure Incident:

An exposure incident occurs when potentially infectious material enters the body through a needlestick, contact with mucous membranes (eyes, inside of nose or mouth, genitals) or contact with broken skin (rash, acne, cuts, scrape). If this occurs,

- Immediately wash the infected are with soap and water or disinfectant for 15 minutes.
- If it is an eye exposure, irrigate the eye at an eyewash station for 15 minutes (do not use disinfectant).
- Apply first aid if necessary.
- Notify your supervisor.
- Call the employer's occupational medicine provider to arrange a post-exposure evaluation.
- Take a Bloodborne Pathogen Exposure Incident Report to the provider to be completed at the evaluation.

APPENDIX D

Image: Example of filled out Hazardous Waste label.

INTERIM GUIDANCE FOR HANDLING AND STORING CHEMICAL WASTES AT TTU

December 14, 2011

ALLOWABLE WASTE CONTAINERS:

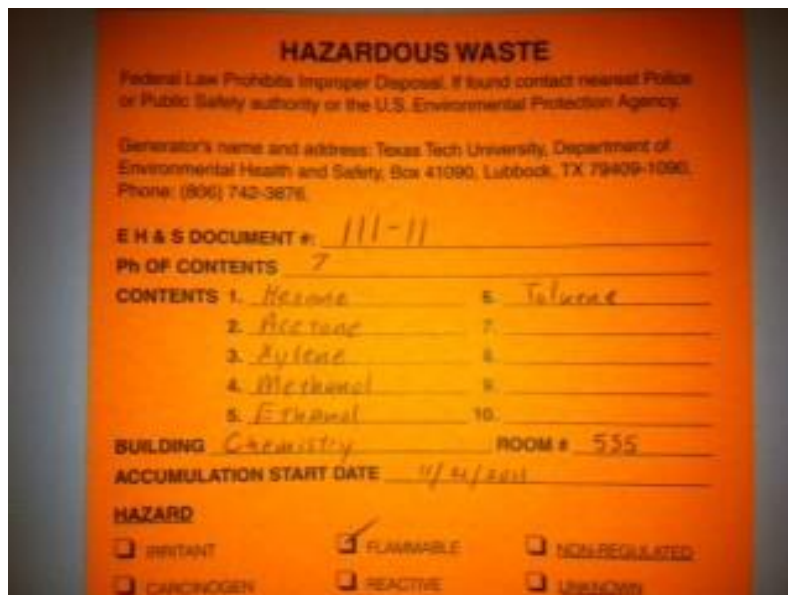
- Use glass or polyethylene containers that will not corrode.
- Containers must be triple rinsed. (Each rinse must be 1/10 the volume of the container and the rinse also collected for disposal)
- The original container label must be completely defaced or removed.
- Metal cans must be used **only** for solvent waste that is non-corrosive. **If metal cans are used, they must be disposed of within 1 month of accumulation start date or when ... full, which ever happens first.**

LABEL ALL WASTE CONTAINERS:

- The contents of a container must be shown and displayed prominently with the label facing forward where it can be seen.
- Use labels such as "Xylene To Be Recycled" or "Xylene To Be Reclaimed" to identify chemicals that can be redistilled or put to other uses.

LABEL ALL WASTE CONTAINERS WITH THE WORDS "HAZARDOUS WASTE" AND THE CONTENTS:

- Use the orange "Hazardous Waste" labels provided by Texas Tech Environmental Health and Safety (TTU EH&S -- 742-3876).



HAZARDOUS WASTE

Federal Law Prohibits Improper Disposal. If found contact nearest Police or Public Safety authority or the U.S. Environmental Protection Agency.

Generator's name and address: Texas Tech University, Department of Environmental Health and Safety, Box 41090, Lubbock, TX 79409-1090, Phone: (806) 742-3876.

E H & S DOCUMENT #: 111-11

Ph OF CONTENTS 7

CONTENTS

1. Hexane	6. Toluene
2. Acetone	7.
3. Xylene	8.
4. Methanol	9.
5. Ethanol	10.

BUILDING Chemistry ROOM # 535

ACCUMULATION START DATE 11/14/2011

HAZARD

<input type="checkbox"/> IRRITANT	<input checked="" type="checkbox"/> FLAMMABLE	<input type="checkbox"/> NON-REGULATED
<input type="checkbox"/> CARCINOGEN	<input type="checkbox"/> REACTIVE	<input type="checkbox"/> UNKNOWN

- All containers of chemical waste must have an accurate EH&S label that lists
 - Accumulation start date
 - pH of contents
 - Each individual chemical waste (full name)
 - Building and room number
 - All hazards posed by the waste checked
- Fill in building, room number and accumulation start date before any waste is added. Update other information as waste is added.

WASTE CONTAINERS:

- **All waste containers must be securely capped or capped with an appropriate venting cap.**
- **Do not leave a funnel in the waste container.**

DO NOT ALLOW LABORATORY WASTE TO ACCUMULATE:

- **Store only ONE container of each kind of waste in the laboratory.**
- **When the waste container is full or it has been one month since accumulation start date**, log on to TTU EH&S website to schedule a chemical waste pickup (<http://www.depts.ttu.edu/ehs/Web/>).

STORAGE OF WASTE CONTAINERS:

- **Store waste only in a fume hood where no reactions are being carried out.** The waste must be segregated, and the sash must be fully closed.
- Store waste away from reactions in progress, equipment and sitting areas inside the laboratory.
- If there is no room in a fume hood to store flammable waste, store it in a flammables cabinet. Do not store flammable waste containers on a bench or floor. To obtain cabinets, contact EH&S (742-3876).
- Segregate waste away from other incompatible waste or chemicals.
- **Do not store waste containers near a sink or floor drain.**

SEPARATING THE WASTE: Incompatible wastes must be stored separately

- **Waste Analysis** - Each person in the laboratory conducting operations must complete a waste analysis. The waste analysis will need to include, but is not limited to what will be generated from the operation, the incompatibilities and how it will be stored. The waste analysis can be either entered in the laboratory notebook that is checked by the PI or in an SOP approved by the PI. If you have any questions about your waste analysis or if you need help contact EH&S at 742- 3876.

- **Halogenated and Non-Halogenated waste** - These wastes need to be segregated from one another in separate containers.

- **Store acids and bases in separate cabinets** - Leaking containers or a spill could cause a violent reaction and emit toxic gases.

- **Store acids and organic waste in separate cabinets** - If these chemicals should mix, a fire or explosion can occur.

- **Do not mix incompatible solvents in the same waste container** - For example, nitric acid and ethanol can form an explosive mixture.

- **Practices used for storage of chemicals should also be used for storage of waste** - Store them by storage groups such as:
 - Compatible Organic Bases
 - Compatible Pyrophoric & Water-Reactive Materials
 - Compatible Inorganic Bases
 - Compatible Organic Acids
 - Compatible Oxidizers including Peroxides
 - Compatible Inorganic Acids not including Oxidizers or Combustible
 - Not Intrinsicly Reactive or Flammable or Combustible
 - Poison Compressed Gases
 - Compatible Explosive or other highly Unstable Material
 - Non-Reactive Flammable and Combustible, including solvents
 - **Incompatible with ALL other storage groups**

Link to *Prudent Practices in the Laboratory* over compatible storage groups

http://www.nap.edu/openbook.php?record_id=12654&page=96

ALWAYS STORE THE FOLLOWING TYPES OF WASTES SEPERATELY FROM EACH OTHER:

- Acids and bases.
- Alkali or alkali earth metals, Alkylolithiums and aqueous waste
- Cyanide, sulfide or arsenic compounds and acids
- Mercury or silver and ammonium containing compounds
- Organics and acids.
- Powdered or reactive metals and combustible materials

DO NOT MIX INCOMPATIBLE WASTES:

- **Before mixing wastes, know your chemicals and how they react.** Consult the MSDS for the chemical and a classic reference such as Bretherick, Hazards in the Chemical Laboratory, 7th. Edition, 2007 to identify proper procedures
- For examples of wastes that **must not be combined**, refer to the following links containing incompatibles charts

<http://web.princeton.edu/sites/ehs/chemwaste/RCRACChemicalCompatibilityList.pdf>
and <http://web.princeton.edu/sites/ehs/chemwaste/compatability.htm>

APPENDIX E

Standard Operating Procedure

for work with

Chemical name/class:	<u>Hydrochloric Acid</u>	CAS #:	<u>7647-01-0</u>
PI:		Date:	
Building:	<u>Biology</u>	Room #:	

1. **Circumstances of Use:**

HCL will be used to adjust the Ph levels of solutions. For example, lysis buffer for Western blots

2. **Potential Hazards:**

- Highly corrosive
- Causes severe skin burns and eye damage.
- Harmful if swallowed or inhaled.
- The OSHA Permissible Exposure Limit for hydrochloric acid is 8 hours at a concentration of 5 ppm.

3. **Engineering Controls:**

- An eyewash and safety shower must be available in the immediate work area for any work with hydrochloric acid.
- If mists are generated either mechanically or from vapor, work must be performed in a chemical fume hood to avoid inhalation.

4. **Work Practice Controls:**

- *Laboratory-specific written procedures for buffers and solutions requiring Ph adjustment with HCL are available in the protocols notebook in lab 01*
- Work should be done in a way that avoids hand/glove contact with hydrochloric acid
- If gloves come in contact with hydrochloric acid, they should be removed and changed immediately.
- After use, decontaminate the area by wiping it down with a soap and water solution.

5. **Personal protective equipment (PPE):**

- Hand protection
Handle with appropriate gloves, such as rubber. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with good laboratory practices. Wash and dry hands.
- Eye protection
Tightly fitting chemical goggles.
- Skin and body protection
Lab coat, long pants, and close-toed shoes

6. **Transportation and 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.
- Bottles of hydrochloric acid should be stored together in an acid (corrosive) cabinet.
- Hydrochloric acid should be stored separately from oxidizing agents, organic materials, and combustible materials.

- Hydrochloric acid and strong mineral acids can be stored in the same cabinet.
- Avoid bases, amines, metals, and oxidizers such as permanganates.

7. **Waste Disposal:**

Handle and store wastes following the guidelines above while accumulating wastes and awaiting chemical waste pickup. Waste must be disposed of in accordance with the Texas Tech University's Chemical Hygiene Plan.

8. **Exposures/Unintended contact:**

Contact the principle investigator of the laboratory or Environmental Health & Safety at 742-3876 for advice on occupational chemical exposures. In the event of an actual chemical exposure notify the principle investigator and Environmental Health & Safety immediately.

- If skin contact occurs, immediately remove contaminated clothing and wash skin with soap and water. Seek medical attention if needed after 15 minutes of water rinsing or if a large area of the body comes in contact with hydrochloric acid.
- For eye exposures, immediately rinse eyes with copious amounts of water for at least 15 minutes while occasionally lifting upper and lower lids. While rinsing eyes have someone seek medical attention.
- If inhaled, move person to fresh air immediately. If not breathing, give artificial respiration and consult a physician.
- If ingested, do NOT induce vomiting. Rinse mouth with water and give large amounts of water or milk, if available. Seek medical attention immediately.

9. **Spill Procedure:**

On Texas Tech University campus, "large" spills of hazardous materials and all mercury spills must be referred to Environmental Health & Safety at 742-3876.

- Small Spill: Ventilate area of spill. Remove all non-essential personnel from area. Don the appropriate PPE and use absorbent pads (some are provided in the spill kit) to clean the area. Place the pads in the accompanying yellow waste bag and contact EH&S to pick up for disposal. If necessary, neutralize spill with a suitable agent, such as powdered sodium bicarbonate.
- Large Spill: Do not attempt to clean up the spill. Contact Environmental Health & Safety at 834-3876.

If at any time the individual does not feel comfortable cleaning up the spill, contact Environmental Health & Safety at 834-3876.

10. **Training of personnel:**

All personnel are required to complete the online Lab Safety Training through the Texas Tech University Environmental Health & Safety website or attend a Laboratory Safety Seminar presented by Texas Tech University Environmental Health & Safety. These trainings include an introduction to general chemical safety. Furthermore, all personnel shall read and fully adhere to this SOP when handling the chemical.



Fisher Scientific

Part of Thermo Fisher Scientific

Material Safety Data Sheet

Creation Date 24-Aug-2009

Revision Date 31-Oct-2011

Revision Number 2

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name	Hydrochloric acid
Cat No.	A142-212; A142P-19; A142P-20; A144-212; A144-212LC; A144-500; A144-500LB; A144-500LC; A144-612GAL; A144C-212; A144C-212EA; A144P-19; A144P-20; A144S-212; A144S-212EA; A144S-500; A144SI-212; A466-1; A466-2; A466-2LC; A466-250; A466-500; A481-212; A481-212LC; S71942SC; S71943; S71943ND; S80038; SA49
Synonyms	Muriatic acid; Hydrogen chloride; HCl (Technical/Certified ACS Plus/Optima/NF/FCC)
Recommended Use	Laboratory chemicals
Company Fisher Scientific One Reagent Lane Fair Lawn, NJ 07410 Tel: (201) 796-7100	Emergency Telephone Number CHEMTREC®, Inside the USA: 800-424-9300 CHEMTREC®, Outside the USA: 001-703-527-3887

2. HAZARDS IDENTIFICATION

DANGER!

Emergency Overview

Causes burns by all exposure routes. May be harmful if inhaled.

Appearance Colorless

Physical State Liquid

odor pungent

Target Organs Skin, Respiratory system, Eyes, Gastrointestinal tract (GI), Liver, Kidney, Teeth

Potential Health Effects

Acute Effects

Principle Routes of Exposure

Eyes

Causes burns.

Skin

Causes burns. May be harmful in contact with skin.

Inhalation

Causes burns. May be harmful if inhaled.

Ingestion

Causes burns. May be harmful if swallowed.

Chronic Effects

Experiments have shown reproductive toxicity effects on laboratory animals. May cause adverse liver effects. May cause adverse kidney effects. Chronic exposure to corrosive fumes/gases may cause erosion of the teeth followed by jaw necrosis. Bronchial irritation with chronic cough and frequent attacks of pneumonia are common. Gastrointestinal disturbances may also be seen.

See Section 11 for additional Toxicological information.

Aggravated Medical Conditions Preexisting eye disorders. Skin disorders.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Haz/Non-haz

Component	CAS-No	Weight %
Water	7732-18-5	62-65
Hydrochloric acid	7647-01-0	35-38

4. FIRST AID MEASURES

Eye Contact

Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Immediate medical attention is required.

Skin Contact

Wash off immediately with plenty of water for at least 15 minutes. Immediate medical attention is required.

Inhalation

Move to fresh air. If breathing is difficult, give oxygen. Do not use mouth-to-mouth resuscitation if victim ingested or inhaled the substance; induce artificial respiration with a respiratory medical device. Immediate medical attention is required.

Ingestion

Do not induce vomiting. Call a physician or Poison Control Center immediately.

Notes to Physician

Treat symptomatically.

5. FIRE-FIGHTING MEASURES

**Flash Point
Method**

No information available.
No information available.

Autoignition Temperature

No information available.

Explosion Limits

Upper
Lower

No data available
No data available

Suitable Extinguishing Media

Substance is nonflammable; use agent most appropriate to extinguish surrounding fire..

Unsuitable Extinguishing Media

No information available.

Hazardous Combustion Products

No information available.

Sensitivity to mechanical impact
Sensitivity to static discharge

No information available.
No information available.

Specific Hazards Arising from the Chemical

Corrosive Material. Causes burns by all exposure routes. Thermal decomposition can lead to release of irritating gases and vapors.

Protective Equipment and Precautions for Firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health 3

Flammability 0

Instability 1

Physical hazards N/A

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions

Use personal protective equipment. Ensure adequate ventilation. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Do not get in eyes, on skin, or on clothing.

Environmental Precautions

Should not be released into the environment.

Methods for Containment and Clean Up

Soak up with inert absorbent material. Keep in suitable, closed containers for disposal..

7. HANDLING AND STORAGE

Handling

Use only under a chemical fume hood. Wear personal protective equipment. Do not breathe vapors or spray mist. Do not get in eyes, on skin, or on clothing. Do not ingest.

Storage

Keep containers tightly closed in a dry, cool and well-ventilated place. Corrosives area.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Measures

Use only under a chemical fume hood. Ensure that eyewash stations and safety showers are close to the workstation location.

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
Hydrochloric acid	Ceiling: 2 ppm	Ceiling: 5 ppm Ceiling: 7 mg/m ³ (Vacated) Ceiling: 5 ppm (Vacated) Ceiling: 7 mg/m ³	IDLH: 50 ppm Ceiling: 5 ppm Ceiling: 7 mg/m ³

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
Hydrochloric acid	Ceiling: 5 ppm Ceiling: 7.5 mg/m ³	Peak: 5 ppm Peak: 7 mg/m ³	CEV: 2 ppm

NIOSH IDLH: *Immediately Dangerous to Life or Health*

Personal Protective Equipment

Eye/face Protection

Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166

Skin and body protection

Wear appropriate protective gloves and clothing to prevent skin exposure

Respiratory Protection

Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State	Liquid
Appearance	Colorless
odor	pungent
Odor Threshold	No information available.
pH	< 1
Vapor Pressure	125 mbar @ 20 °C
Vapor Density	1.27 (Air = 1.0)
Viscosity	1.8 mPa.s @ 15°C
Boiling Point/Range	57°C / 135°F @ 760 mmHg
Melting Point/Range	-35°C / -31°F
Decomposition temperature	No information available.
Flash Point	No information available.
Evaporation Rate	No information available.
Specific Gravity	1.18
Solubility	Soluble in water
log Pow	No data available
Molecular Weight	55.55
Molecular Formula	HCl.H ₂ O

10. STABILITY AND REACTIVITY

Stability	Stable under normal conditions.
Conditions to Avoid	Incompatible products. Excess heat.
Incompatible Materials	Strong oxidizing agents, Reducing agents, Bases, Metals
Hazardous Decomposition Products	Carbon monoxide (CO), Carbon dioxide (CO ₂), Hydrogen chloride gas
Hazardous Polymerization	Hazardous polymerization does not occur.
Hazardous Reactions .	None under normal processing..

11. TOXICOLOGICAL INFORMATION

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Water	4550 mg/k (Rat)	Not listed	Not listed
Hydrochloric acid	700 mg/kg (Rat)	5010 mg/kg (Rabbit)	3124 ppm (Rat) 1 h

Irritation Causes burns by all exposure routes

Toxicologically Synergistic Products No information available.

Chronic Toxicity

Carcinogenicity

The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	ACGIH	IARC	NTP	OSHA	Mexico
Hydrochloric acid	Not listed	group 3	Not listed	Not listed	Not listed

IARC: (International Agency for Research on Cancer)

IARC: (International Agency for Research on Cancer)

Group 1 - Carcinogenic to Humans

Group 2A - Probably Carcinogenic to Humans

Group 2B - Possibly Carcinogenic to Humans

Sensitization

No information available.

Mutagenic Effects

Mutagenic effects have occurred in experimental animals.

Reproductive Effects

Experiments have shown reproductive toxicity effects on laboratory animals.

Developmental Effects

Developmental effects have occurred in experimental animals.

Teratogenicity

Teratogenic effects have occurred in experimental animals..

Other Adverse Effects

See actual entry in RTECS for complete information.

Endocrine Disruptor Information

No information available

12. ECOLOGICAL INFORMATION

Ecotoxicity

Do not empty into drains.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Hydrochloric acid	Not listed	282 mg/L LC50 96 h	Not listed	Not listed

Persistence and Degradability

No information available

Bioaccumulation/ Accumulation No information available

Mobility

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13. DISPOSAL CONSIDERATIONS

Waste Disposal Methods

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. TRANSPORT INFORMATION

14. TRANSPORT INFORMATION

DOT

UN-No UN1789
 Proper Shipping Name HYDROCHLORIC ACID
 Hazard Class 8
 Packing Group II

TDG

UN-No UN1789
 Proper Shipping Name HYDROCHLORIC ACID
 Hazard Class 8
 Packing Group II

IATA

UN-No UN1789
 Proper Shipping Name Hydrochloric acid
 Hazard Class 8
 Packing Group II

IMDG/IMO

UN-No UN1789
 Proper Shipping Name Hydrochloric acid
 Hazard Class 8
 Packing Group II

15. REGULATORY INFORMATION

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	CHINA	KECL
Water	X	X	-	231-791-2	-		X	-	X	X	X
Hydrochloric acid	T	X	-	231-595-7	-		X	X	X	X	X

Legend:

X - Listed

E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.

F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.

N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.

P - Indicates a commenced PMN substance

R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.

S - Indicates a substance that is identified in a proposed or final Significant New Use Rule

T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.

XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B)).

Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.

Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Hydrochloric acid	7647-01-0	35-38	1.0

SARA 311/312 Hazardous Categorization

Acute Health Hazard	Yes
Chronic Health Hazard	Yes
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Hydrochloric acid	X	5000 lb	-	-

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Hydrochloric acid	X		-

OSHA

Component	Specifically Regulated Chemicals	Highly Hazardous Chemicals
Hydrochloric acid	-	TQ: 5000 lb

CERCLA

This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Hydrochloric acid	5000 lb	5000 lb

California Proposition 65

This product does not contain any Proposition 65 chemicals.

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Hydrochloric acid	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ):	Y
DOT Marine Pollutant	N
DOT Severe Marine Pollutant	N

U.S. Department of Homeland Security

This product contains the following DHS chemicals:

Component	DHS Chemical Facility Anti-Terrorism Standard
Hydrochloric acid	0 lb STQ (anhydrous); 11250 lb STQ (37% concentration or greater)

Other International Regulations

Mexico - Grade No information available

Canada

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Hazard Class

D1A Very toxic materials

E Corrosive material



16. OTHER INFORMATION

Prepared By Regulatory Affairs
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Email: EMSDS.RA@thermofisher.com

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Revision Summary "****", and red text indicates revision

Disclaimer

The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of MSDS

APPENDIX F

BARCODE RETURN

Attach barcode to sheet and turn in to Environmental Health and Safety when chemical bottle is empty.

This sheet can accompany waste transfer form or mailed to MS 1090

Building: Lab Number: Principal Investigator: _____
If you have questions contact Environmental Health and Safety at 742-3876

If you have questions contact Environmental Health and Safety at 742-3876
