Mountain View College
DALLAS COUNTY COMMUNITY COLLEGES

SCIENCE, ALLIED HEALTH AND PHYSICAL EDUCATION DIVISION

SCIENCE LABORATORY CHEMICAL HYGIENE PLAN

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IN CASE OF A LAB EMERGENCY:

IF THERE IS AN INJURY:

Follow MSDS recommendations for First Aid
AND

1. Use the red call box on the wall across from the chemistry lab W20
OR
2. Use your cell phone to call 972-860-4290
OR
3. Use a campus phone and dial 911 without the "9" prefix

All of these options will connect you with DCCCD's Dispatch Center who will coordinate ambulance, fire, and police as necessary.

In all cases, do all of the following:

- **Evacuate the room (and area, if necessary)**
- **Call MVC Police who will call the nurse** **214-860-8758**
- **Call Dr. Valencia (days)** **214-860-3687**
  OR Evening Administration (nights) **214-364-4782**
- **Call MVC Facilities** **214-860-8670**
- **Notify the Lab Coordinator**

Follow-up:

- **Make sure lab coordinator is notified to call for waste disposal service (We currently use Green Planet at 972-636-1515)**
- **Make sure incident report (Appendix B) is filed with:**
  - **Dr. Valencia**
  - **Police**
  - **Facilities**
  - **Human Resources**

2.0 Introduction

The Chemical Hygiene Plan is a summarization of policies and procedures regarding the use and handling of chemicals stored in the Science, Allied Health and Physical Education (SAPE) laboratories at Mountain View College. This Chemical Hygiene Plan has been written to comply with OSHA 29 CFR 191.1450 Occupational Exposures to Hazardous Chemicals in Laboratories Final Rule. All personnel involved in the laboratories where chemicals are used should observe the safety practices and guidelines outlined in the Chemical Hygiene Plan.

2.1 Training

- All personnel must undergo training in the proper use and handlings of all chemicals used and stored in the labs. Lab instructors will inform students of the various hazards associated with the chemicals used during lab classes. Both students and SAPE personnel will sign that they have received Hazardous Materials training once per semester.
- The Texas Hazard Communication Act of 1985 Notice will be displayed prominently in each laboratory (See Appendix A).

2.2 Material Safety Data Sheets (MSDS)

The Occupational Safety and Health Association (OSHA) requires that all chemical manufacturers and distributors provide Material Safety Data Sheets (MSDS) for all products. OSHA requires that MSDS be maintained in the workplace for all hazardous chemicals. Each department that possesses or uses chemicals will have copies of the MSDS for each chemical in current usage in each department and these copies will be stored in hard copy format in each lab. Mountain View uses MSDS Online for updating MSDS materials but hard copy files or notebooks are to be maintained within easy accessibility in each lab. MSDS identity or chemical names for each chemical used in each department must be archived for thirty (30) years [OSHA 29 CFR 1910.1020 (d) (1) (ii) (B)]; archived MSDS archives will be maintained by Mountain View facilities department. A chemical inventory and tracking will be maintained for all chemicals received by Mountain View laboratories.

3.0 General Safety Procedures

- MSDS for any chemical used in a lab activity must be prominently displayed in the lab at the time the activity is done and hazards of usage must be discussed with students before the activity is performed.
- Proper protective clothing must be worn at all times when handling potentially hazardous chemicals.

- The location and operation of all safety equipment should be known, e.g. safety shower, eye wash station, fire extinguisher, first-aid kit, and spill kit. Also, the area around each item should be kept clear of obstructions.
- Long hair, loose clothing and dangling jewelry must be restrained to prevent accidents.
- Areas where chemicals have been used must always be cleaned by washing them free of chemicals and wiping them dry. Also, hands must be washed after working with chemicals and specimens.
- Eating, drinking, chewing gum, smoking, and/or applying makeup are not permitted in the labs. Food and drink must not be stored in laboratory refrigerators.
- Behavior which could endanger the safety of another lab occupant can not be tolerated.
- All chemical exposure such as inhalation, skin absorption or ingestion must be minimized. Chemicals should not be sniffed nor tasted. Vent hoods must be used when using chemicals which may discharge harmful fumes.
- Chemical exposures should be controlled by substituting harmful materials with less harmful materials when possible.

3.1 Emergency Procedures

Emergency procedure manuals and exit route maps are located in each lab as well as the lab prep areas. Instructors/lab employees will instruct all persons entering the lab areas on emergency procedure manuals, exit route maps, emergency equipment location, and alternate evacuation routes. In case of fire or serious accident, the protocol in Item 1.0 must be followed.

4.0 Personal Protective Equipment (PPE)

Proper protective clothing must be worn at all times when handling potentially hazardous chemicals.

- Chemical resistant gloves such as latex gloves are required when dispensing chemicals from containers. They should be inspected before use and disposed properly.
- Safety glasses, goggles and/or face shield must be worn by laboratory staff, workers, students, and visitors when using, transferring and handling chemicals as protocol dictates or when in an area where chemicals are used or stored. Contact lenses are not acceptable in lieu of protective eyewear.
- Closed-toe shoes and goggles must be worn by anyone entering a chemistry lab.
- Protective respiratory equipment must be used whenever fumes or air contaminants are present.
- Depending on the hazard of the chemical, lab coats will be required to be worn when using chemicals. Lab coats should not be worn outside of the lab areas.

- It will be required that all persons entering the labs wear proper personal protective clothing while working with hazardous materials. Any individual who repeatedly fails to wear the required proper personal protective clothing should be asked to leave the laboratory until proper procedures are followed.

5.0 Emergency Equipment and Procedures

All lab personnel, workers, and students must familiarize themselves with emergency equipment and procedures. Emergency equipment is to be inspected regularly by Mountain View Facilities.

5.1 Safety Showers/Eyewash stations

All persons working or participating in activities in the lab areas should familiarize themselves with the locations of the safety showers and eyewash stations. Instructors will show students where these areas are located at the beginning of the semester. Also, safety showers and eye wash stations must not be blocked by equipment or other obstructions.

5.2 Fire Extinguishers/Fire Blankets

All persons working or participating in activities in the lab areas should familiarize themselves with the locations of the fire extinguishers and fire blankets Instructors will show students where these areas are located at the beginning of the semester. Also, fire extinguishers and fire blankets must not be blocked by equipment or other obstructions.

6.0 Special Requirements for Working in the Labs

In instances in which students will need to work in the labs at times which were not scheduled for them, students must have the permission of the instructor holding lab at that time to enter the lab. Students are not allowed to be in any lab without the supervision of a contracted lab instructor or a lab coordinator. Students are not allowed to be in any lab under the supervision of a lab work study. Children are not allowed in the labs at any time.

7.0 Chemical Storage/Labels/Disposal

Chemicals must be stored, labeled, and disposed properly.

7.1 General Procedures for Chemical Storage/Labels/Disposal

Listed below are the minimum guidelines which apply to laboratories using hazardous materials:

- All containers which are used to store chemicals must be properly identified by affixed labels that include the name of the chemical, the manufacturer from which the chemical comes, and the associated hazards of the chemical.
- Incompatible chemicals may not be stored next to one another. Chemicals must be grouped according to hazard class with the larger containers stored on bottom shelves.
- All containers which are used to store flammable solvents must be stored in approved metal storage cabinets. Flammables and strong oxidizers should be separated.
- All non-flammable chemicals and reagents should be stored on shelves and cabinets which are designated for those chemicals. Acids and bases should be segregated and stored on bottom shelves or cabinets as provided.
- All lab equipment, chemicals, and other miscellaneous items must be returned to their proper storage area.
- Access to exits, emergency equipment and utilities must not be blocked.

7.2 Hazardous Materials

The following guidelines are for labs using or storing hazardous materials:

- A list of hazardous chemicals used or stored in excess of 55 gallons or 500 pounds must be kept and updated once a year. A chemical tracking plan must be maintained.
- Flammable storage cabinets should meet required safety standards and have positive latch doors
- Flammable chemicals that require refrigeration must be stored in explosion-proof refrigerators.
- Chemicals or substances that emit noxious or toxic vapors must be kept in a ventilated storage cabinet or ventilated area.
- Ventilating hoods must be used for any activity which might result in release of toxic vapors or particulate matter. The hood should be kept closed. Storage of materials in the hoods should be minimized and not allowed to block air flow.
- Ignition sources such as flames or non-explosion proof electrical devices are not allowed in areas where flammable chemicals are used or stored.
- Chemicals that are incompatible such as strong acids and bases or oxidizing agents and organic reagents must not be stored in close proximity to on e another and must be stored on bottom shelves, if possible.
- Computers must be turned off when flammable chemicals are being used.
- Procedures for working with hazardous materials are outlined in Prudent Practices for Handling Hazardous Chemicals in Laboratories, National Academy Press, Washington, D.C., 1981. This book is available for review in the chemistry lab.

7.3 Container Labeling

The following are chemical identification guidelines:

- Mandatory training in labeling is required for all lab personnel.
- All chemical containers must be dated when received and a National Fire Protection Association (NFPA) label affixed to the original container if one is not already affixed.
- Chemicals may not be used if stored in unlabeled containers. Unlabeled containers must be disposed properly.
- Exceptions to labeling are containers intended for immediate used by lab employees or by students performing lab experiments in which transfers have been made of chemicals from labeled containers.
- Portable containers of chemicals which are to be used within twenty-four (24) hours must be labeled with MSDS, manufacturer name and chemical name.
- Areas such as refrigerators, labs and storage rooms have signs indicating when there are specific hazards present (e.g. carcinogens, biohazards).

7.4 Disposal of Chemical Waste

The following are guidelines for the disposal of chemical waste:

- Chemical waste is not to be disposed down lab drains with the exception of minute quantities of water-soluble and non-regulated waste that may be permitted to be disposed down the lab drain with the permission of the lab instructor or lab coordinator.
- The chemistry department has three containers labeled *organic*, *non-organic*, and *solid waste*. These containers must be properly labeled at all times. A satellite receptacle for hazardous waste is located in the prep area of the Chemistry Department.
- When disposing of chemical waste, the date, chemical name disposed, concentration (if applicable) and quantity of chemical; must be written in the chemical waste book.

7.5 Chemical Cleanup

- Glassware and equipment should only be used for their designated purposes. Only lab instructor or lab personnel are authorized to clean up chemical spills or glass breakage; students are not allowed to do so.
- Only the minimum amount of chemical needed for a lab activity should be available in the lab to reduce the risk of a hazardous chemical spill.
- Chemicals in excess of that needed for a lab activity should be disposed as directed in Section 7.4.
- Broken glass must be disposed in the broken glass receptacle located in the lab prep area.
- Mercury spill kits should be used to clean up a mercury spill; these are located near areas of mercury use.
- All lab personnel must be trained in the proper use and handling of equipment used in chemical cleanups.

8.0 Chemical Hazards and Controls

8.1 Inhalation Exposure

- Vapors should not be inhaled.
- All experiments which may generate vapors must be performed under a fume hood.
- Windows and doors should be kept closed so that ventilation systems work properly.

8.2 Ingestion Exposure

- Chemicals should never be pipetted by mouth; appropriate pipettes must be used.
- Eating, drinking, gum-chewing, and application of makeup are not allowed in lab areas. Food and drink must not be stored in laboratory refrigerators.
- No chemical should be tasted or inhaled in the labs
- Hands should be washed after handling chemicals.

8.3 Absorption Exposure

- Personal Protective Gear (PPE) should be worn when mixing or handling chemicals
- If skin is exposed to chemical absorption, the protocol in Item 1.0 should be followed and the MSDS should be consulted for proper treatment.

8.4 Chemical Hazard Class Ratings

Mountain View College currently uses the National Fire Protection Association (NFPA) label on all chemicals or substances that the college uses (See Appendix C). All secondary containers must also have NFPA labels affixed. Most chemicals used by Mountain View College already have the NFPA ratings or Hazardous Material information System (HMIS) ratings on the containers when received from vendors. Both ratings state the same information; NFPA ratings are diamon0shaped and HMIS ratings are rectangular-shaped. HMIS ratings have an additional symbol indicating the PPE to be worn while working with the chemical.

Appendix A

TEXAS HAZARD COMMUNICATION ACT

OVERVIEW
TEXAS HAZARD COMMUNICATION ACT
TITLE TAC 25, Section 295.1-295.12

Chapter 502

The Texas Hazard Communication Act and the Public Employer Community Right-To-Know Act are patterned after the Federal OSHA Hazard Communication Standard and the Emergency Planning and Community Right-To-Know Act. The following is an overview of the provisions that apply to political subdivisions.

NOTICE TO EMPLOYEES- A workplace notice must be posted at locations where notices normally are posted in work centers.

WORKPLACE CHEMICAL LIST- Compile and maintain a chemical list for each facility/workplace. Included in the list shall be each hazardous chemical in excess of 55 gallons or 500 lbs. normally used or stored at the location. The chemical list must be updated at least once a year.

The list must be readily available to employees. New or newly assigned employees must be made aware of the list BEFORE working with or in a work area containing hazardous chemicals. The chemical list must be maintained for thirty (30) years.

TIER TWO FORMS- Information on large quantity items (500 pounds or the Threshold Planning Quantity in pounds for the specific listed chemical, whichever amount is less) of Extremely Hazardous Substances listed and for all other "generally hazardous chemicals", the threshold for reporting is 10,000 pounds, shall be reported to the Texas Department of Health each year, also to Local Emergency Planning Committees(LEPC).

PLANNING LETTERS- A Planning letter shall be submitted within 60 days of acquiring any of the Extremely Hazardous Substances more than the Threshold Planning Quantity (TPQ), or 500 pound level. The Planning letter is submitted to the Texas Department of Health and to Local Emergency Planning Agencies.

MATERIAL SAFETY DATA SHEETS- Maintain the most current MSDS received from manufactures or distributors for each hazardous chemical used or stored at the facility/workplace. If an MSDS is not provided, a written request to the manufacture or the distributor must be made in a timely manner. MSDS shall be readily available for review by employees and copies must be provided to the Texas Department of Health on request.

LABELS- Existing labels on containers shall not be removed or defaced. Employees are not required to work with a hazardous chemical from an unlabeled container. Labels must include the name of the product and appropriate hazard warning.

EDUCATION AND TRAINING- Employees shall be provided an education and training program to all those employees that handle or work with hazardous chemicals on an as need basis. The program shall cover the use and handling of hazardous chemicals in the work area (including the addition of new chemicals). New or newly assigned employees shall be provided training BEFORE working with or in a work area containing hazardous chemicals.

The Act requires you to keep a record of training. After each training class each employee will sign a form to verify that they attended the training, the written Hazard Communication Program was made available for review, and that the employee understands the program. Training logs for the training must be maintained by the department and made available to a representative of the Texas Department of Health upon request.

PENALTIES- If the state finds one or more violations of the Act it may assess an **Administrative Penalty** and issue a Notice Of Violation. The NOV will spell out in detail the violation(s), and refer to the applicable section or subsection of the chapter. The employer has 15 days to respond to the notice. The employer may request a hearing or correct the violation(s) and certify the corrections have been made. If the violation(s) are not addressed, a penalty of $500 for each violation(s) may be levied.

If it appears that an employer has violated, is violating, or is threatening to violate the Act, the attorney general or the district, county, or city attorney may institute a **Civil Penalty**. The penalty may be in an amount not to exceed $2,000 a day for each violation, with a total not to exceed $20,000 for that violation. In determining the amount of the penalty, the court shall take into account the employer's history, the seriousness of the violation, any hazard to health and safety of the public.

An employer who is required to disclose hazard information and who proximately causes an occupational disease or injury to an individual by disclosing false information or knowingly fails to inform as provided on an MSDS, commits an offense that may constitute a **Criminal Penalty** with a fine that may not exceed $100,000 for that violation.

EMPLOYEE RIGHTS- The employer may not discharge, cause to be discharged, or otherwise discipline or discriminate against an employee because the employee has filed a complaint, assisted an inspector, instituted any proceedings related to, testified in a proceeding, or exercised any rights afforded under the Act on behalf of the employee or the behalf of others.

After attending the training class, each employee will sign a form to verify that they attended the training, and that the written Hazard Communication Program was made available for review.

Appendix B

OSHA/Employee's Right to Know

http://osha.ov/SLTC/hazardcommunications/index.html

Appendix C

MOUNTAIN VIEW COLLEGE SPILL/HAZARDOUS MATERIAL INCIDENT/ACCIDENT REPORT

MOUNTAIN VIEW COLLEGE
SPILL/HAZARDOUS MATERIAL INCIDENT/ACCIDENT REPORT

Submit one report per individual involved in spill.

Spill/Accident Reported By:

Name: _____Title: _____

Department: _____Bldg: _____Room: _____

Phone: _____

Spill/Accident Incident Information:

a. **Spill/Accident occurred date: _____Time: _____**

b. **Spill/Accident location (building, room, area and surface or space involved):**

_____
_____
_____
_____

c. **Hazardous Material Information:**

_____
_____

1. Name of material(s) - chemical(s) spilled:

_____
_____
_____

2. Amount (of each agent) spilled:_____

3. Material Hazard Characteristics (as appropriate):

Toxic ☐ Flammable ☐ Corrosive ☐ Oxidizer ☐ Toxin ☐ Reactive ☐

Radioactive ☐ Biological ☐ Solid ☐ Liquid ☐ Gas ☐

4. Severity of spill (check one): Minor:_____Major:_____

d. **Description of Accident/Circumstances:**

_____
_____
_____
_____

e. List person(s) involved in spill:

f. Actions taken (check and enter appropriate information):

1. Informed supervisor/safety personnel (name):_____Time:_____

2. Others informed:_____ Time:____

3. Other actions taken (check and fill in information):

	Time:
☐ Consulted MSDS	_____
☐ Closed Laboratory/Swing Doors	_____
☐ Sounded Fire Alarms	_____
☐ Called Ambulance	_____
☐ Called Fire Department	_____
☐ Consulted Chemical Database	_____

4. Injuries (check yes or no): ☐ no ☐ yes

If yes, fill in information below:

Name of person(s) injured:	Type of Injury	MVC Employee (Yes or No)
_____	_____	☐ yes ☐ no
_____	_____	☐ yes ☐ no
_____	_____	☐ yes ☐ no

6. Clean-up procedures performed:

Signature and date of individual filing form:

_____ _____

Signature **Date**

Appendix D

NFPA Labels

http://www.uwplatt.edu/chemep/chem/saf/nfpa-d.htm

APPENDIX E

Common Safety Symbols

http://en.wikipedia.org/wiki/Safety_symbol

APPENDIX E

The following tables show partial list of incompatible chemicals, and general classes of incompatible materials.

Partial List of Incompatible Chemicals
(Reactive Hazards)

Substances in the left hand column should be stored and handled so that they cannot accidentally contact corresponding substances in the right hand column under uncontrolled conditions.

Chemical	Separate From
Acetic Acid	Chromic acid, nitric acid, peroxides, permanganates
Acetic anhydride	Hydroxyl-containing compounds such as ethylene glycol, perchloric acid
Acetone	Concentrated nitric and sulfuric acid mixtures, hydrogen peroxide
Acetonitrile	Strong acids and bases
Acetylene	Chlorine, bromine, copper, silver, fluorine, mercury
Alkali and alkaline earth metals, such as sodium, potassium, lithium, magnesium, calcium, powdered aluminum	Carbon dioxide, carbon tetrachloride, other chlorinated hydrocarbons (also prohibit the use of water, foam, and dry chemical extinguishers on fires involving these metals—dry sand should be employed)
Ammonia (anhydrous)	Mercury, chlorine, calcium hypochlorite, iodine, bromine, hydrogen fluoride
Ammonium hydroxide	Strong acids, hydrogen peroxide, acidic metals
Aniline	Nitric acid, hydrogen peroxide
Chromic acid and chromium trioxide	Acetic acid, naphthalene, camphor, lycerol, turpentine, alcohol, other flammable liquids
Chlorine	Ammonia, acetylene, butadiene, butane, other petroleum gases, hydrogen, sodium carbide, turpentine benzene, finely divided metals
Chloroform	Alkali metals (e.g. sodium, potassium), acetone, strong bases
Copper	Acetylene, hydrogen peroxide
Fluorine	Isolate from everything
Formaldehyde	Nitric acid, sulfuric acid, hydrochloric acid, perchloric acid, anhydrides, inorganic acids
Hydrazine	Hydrogen peroxide, nitric acid, any other oxidant
Hydrocarbons (benzene, butane, propane, gasoline, turpentine, etc.)	Fluorine, chlorine, bromine, chromic acid, peroxides
Hydrochloric acid	Strong bases, permanganates, chlorates, chlorites
Hydrocyanic acid	Nitric acid, alkalis
Methanol	Perchloric acid, sulfuric acid, nitric acid, highly reactive metals (e.g., potassium, sodium, magnesium)
Nitric Acid	Acetic anhydride, acetone, acetonitrile, alcohols, thiols, amines, dichloromethane, DMSO, benzene, bases
Phenol	Nitric acid, perchloric acid, sulfuric acid

Pyridine	dinitrogen tetroxide, acid chlorides, anhydrides, perchloric acid

Click here to view Classes of Incompatible Chemicals

Physical Hazards

Flammable Materials

Flammable materials include aerosols, gases, liquids, and solids. In most laboratory situations, gases, liquids, and solids will be the main concern. Flammable gases are defined by OSHA to be "(A) a gas that, at ambient temperature and pressure, forms a flammable mixture with air at a concentration of 13% by volume or less; or (B) a gas that, at ambient temperature and pressure, forms a range of flammable mixtures with air wider than 12% by volume, regardless of the lower limit." Flammable liquids mean any liquid having a flashpoint below 100°F. Flammable solid means "a solid, other than a blasting agent or explosive, that is liable to cause fire through friction, absorption of moisture, spontaneous chemical change, or which burns so vigorously and persistently as to create a serious hazard." The Material Safety Data Sheet is a good source for determining if a chemical is flammable. In addition, most flammable substances are labeled as such. The following recommendations should be observed when working with flammable materials:

- Eliminate ignition sources such as open flames, hot surfaces, and operation of mechanical and electrical equipment that is not intrinsically safe.
- Store in NFPA approved flammable storage cabinets, in an area isolated from ignition sources, or in a special storage room designed for flammable materials.
- Ensure proper grounding and avoid creating static electricity. (i.e., Grounding metal containers when transferring flammable liquids.)
- And, of course, NO SMOKING!

Other regulations apply to the use and storage of flammable materials here at Duke.

All laboratory use refrigerators and freezers are required by the Durham Fire Marshal to be labeled as "Approved," or "Not Approved for Flammable Storage." An OESO-Laboratory Safety representative will provide labels during routine audits of your area. Labels may also be requested by calling 684-8822.

Corrosive Materials

Corrosive materials are those that cause visible destruction of, or irreversible alterations in, living tissue by chemical action at the site of contact. The ones that most people who work in labs are familiar with are strong acids and strong bases. Strong oxidizing materials can also cause burns and damage to the eyes and skin. Corrosive material should be stored in well ventilated areas with secondary containment. The secondary containment, usually a plastic wash basin or the like, not only contains leaks and spills, but also prevents some of the metallic corrosion these materials can promote. The

Material Safety Data Sheet is a good source for determining if a material is corrosive. In addition, corrosive materials are labeled as such.

Oxidizers

Oxidizers are agents that initiate or promote combustion in other materials, thereby causing fire either of itself or through the release of oxygen or other gases. Examples of oxidizers include potassium permanganate ($KMnO_4$), sodium chlorate ($NaClO_4$), concentrated nitric acid (HNO_3), and ammonium nitrate (NH_4NO_3). Oxidizers form explosive combinations with flammable, or combustible material. For this reason, they should be stored away from solvents, and in a cool, dry location. (Not under the sink!) The Material Safety Data Sheet is a good source for determining if a material is an oxidizer.

Water Reactive Materials

Water reactive materials are chemicals which react violently with water to produce heat and flammable or toxic gas. Most water reactive materials are found in chemistry, however a few hydrides and alkali metals like sodium are used in other research areas throughout the University. Examples of water reactive materials include calcium hydride, lithium aluminum hydride, sodium, potassium, and lithium metals. These type of materials should be stored in cool, dry locations; never under a sink. Alkali metals are stored under mineral oil to prevent reaction with moisture in the air. The Material Safety Data Sheet is a good way to determine if a material is water-reactive.

Water-Reactive Chemicals Alkali metals Alkali metal hydrides Alkali metal amides Metal alkyls, such as lithium alkyls and aluminum alkyls Grignard reagents Halides of nonmetals, such as BCl_3, BF_3, PCl_3, PCl_5, $SiCl_4$, S_2Cl_2 Inorganic acid halides, such as $POCl_3$, $SOCl_2$, SO_2Cl_2 Anhydrous metal halides, such as $AlCl_3$, $TiCl_4$, $ZrCl_4$, $SnCl_4$ Phosphorus pentoxide Calcium carbide Organic acid halides and anhydrides of low molecular weight

Pyrophoric Materials

Pyrophoric means a chemical that will ignite spontaneously in air at a temperature of 130°F (54°C) or below.

Classes of Pyrophoric Chemicals Grignard reagents, RMgX Metal alkyls and aryls, such as RLi, RNa, R_3Al, R_2Zn Metal carbonyls, such as $Ni(CO)_4$, $Fe(CO)_5$, $Co_2(CO)_8$ Alkali metals such as Na, K

Metal powders, such as Al, Co, Fe, Mg, Mn, Pd, Pt, Ti, Sn, Zn, Zr
Metal Hydrides, such as NaH, LiAlH 4
Nonmetal hydrides, such as B 2 H 6 and other boranes, PH 3 , AsH 3
Nonmetal alkyls, such as R 3 B, R 3 P, R 3 As
Phosphorus (white)

Peroxide Forming Materials

Peroxide forming materials are chemicals which can form shock sensitive peroxide crystals over time or upon exposure to air. The most common peroxide forming chemicals in use are diethyl ether and tetrahydrofuran (THF). Peroxide formation cannot be prevented once the chemical has been opened unless the chemical is maintained under an inert atmosphere (impractical). For this reason, it is recommended that all peroxide formers be dated when received, and periodically evaluated using test strips to indicate peroxide formation. It is prudent practice to maintain only the inventory necessary to complete ongoing work. DO NOT STOCKPILE! The Material Safety Data Sheet is a good source for determining if a material is capable of forming peroxides.

Classes of Chemicals That Can Form Peroxides Upon Aging

Class I: Unsaturated materials, especially those of low molecular weight, may polymerize violently and hazardously due to peroxide initiation.

Acrylic acid
Acrylonitrile
Butadiene
Chlorobutadiene (chloroprene)
Chlorotrifluoroethylene
Methyl methacrylate
Styrene
Tetrafluoroethylene
Vinyl acetate
Vinyl acetylene
Vinyl chloride
Vinyl pyridine
Vinylidene chloride

Class II: The following chemicals are a peroxide hazard upon concentration (distillation/ evaporation). A test for peroxide should be performed if concentration is intended or suspected.

Acetal
Cumene
Cyclohexene
Cyclooctene
Cyclopentene
Diacetylene
Dicyclopentadiene
Diethylene glycol dimethyl ether (diglyme)
Diethyl ether (ether)
Dioxane (r-dioxane)
Ethylene glycol dimethyl ether (glyme)
Furan
Methyl acetylene
Methyl cyclopentane
Methyl-i-butyl ketone
Tetrahydrofuran
Tetrahydronaphthalene
Vinyl ethers

Class III: Peroxides derived from the following compounds may explode without concentration.

Organic	Inorganic
Divinyl ether	Potassium metal
Divinyl acetylene	Potassium amide
Isopropyl ether	Sodium amide (sodamide)
Vinylidene chloride	

NOTE: Lists are illustrative but not exhaustive.

Cryogenic Gases and Liquids

Cryogenic materials can be defined as liquefied or solidified gases at low temperatures. Examples of cryogenics are liquid helium, nitrogen, oxygen, and dry ice (solidified carbon dioxide). The hazards involved in using cryogenics are tissue damage (frostbite) asphyxiation due to oxygen displacement, and potential explosion due to pressure buildup. Another hazard associated with the use of liquid hydrogen, helium, and nitrogen in particular is potential condensation of liquid oxygen. If liquid oxygen comes in contact with an oxidizable material an explosion is possible. The following guidelines should be used when working with cryogenic gases and liquids:

- Cryogenics should be stored and used in well ventilated areas. Closets or other small areas should be avoided when possible.
- Gloves to protect against extreme temperatures should always be used when handling, and transporting cryogenic materials.
- A face-shield should be worn when decanting or entering an open container of cryogenic material.
- Cryogenic materials should only be transported in approved containment devices. (i.e. Dewar flasks, etc.) Care should be taken to ensure that the devices do not become over pressurized by expanding gases.
- Only containers with a tight fitting cap to prevent leakage and certified to leak at less than, or equal to, 1 liter of liquid, or 1 kilogram of solid, per day can be used for elevator transport.

Explosives

Explosive means a chemical that causes a sudden release of pressure, gas, and heat when subjected to sudden shock, pressure or high temperature. The table below contains a list of potentially explosive combination of common laboratory reagents.

Potentially Explosive Combinations of Some Common Reagents
Acetone + Chloroform in the presence of a base

Acetylene + Copper, Silver, Mercury, or their salts
Ammonia (including aqueous solutions) + Cl 2 , Br 2 , or I 2
Carbon Disulfide + Sodium azide
Chlorine + an alcohol
Chloroform or Carbon tetrachloride + powdered Aluminum, or Magnesium
Decolorizing Carbon + an oxidizing agent
Diethyl ether + chlorine (including a chlorine atmosphere)
Dimethyl sulfoxide + an acyl halide, SOCl 2 , or POCl 3
Dimethyl sulfoxide + CrO 3
Ethanol + Calcium hypochlorite
Ethanol + Silver Nitrate
Nitric Acid + Acetic acid, or Acetic anhydride
Picric acid + a heavy-metal salt, such as Pb (lead), Hg (mercury), or Ag (silver)
Silver Oxide + Ammonia + Ethanol
Sodium + a chlorinated hydrocarbon
Sodium hypochlorite (bleach) + and amine

Source: http://www.safety.duke.edu/SafetyManuals/LabManual/index.htm