

CHEMICAL HYGIENE PLAN

TAKOMA PARK CAMPUS DEPARTMENT OF CHEMISTRY



SEPTEMBER 14, 2017 MONTGOMERY COLLEGE 7600 Takoma Ave. Silver Spring, MD 20912

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MONTGOMERY COLLEGE SILVER SPRING/TAKOMA PARK CHEMISTRY

CHEMISTRY LABORATORY SAFETY REGULATIONS AND REQUIREMENTS

The following rules address only the most frequent safety problems. Immediate hazards in the laboratory may cause permanent injury to you or a fellow classmate. An informed respect for safety rules and a dedicated adherence to them can greatly reduce these concerns.

Be Alert, Stay Informed, Use Common Sense, and ALWAYS FOLLOW THE DIRECTIONS OF YOUR INSTRUCTOR.

Wear Proper Laboratory Attire:

- <u>Always wear your safety goggles</u>. At no time should you be in the laboratory without eye protection. You will not be allowed in the lab without goggles. Even if you are not working, your neighbor's work can be dangerous. Each student is responsible for supplying his/her own safety goggles. If a chemical gets into your eye, FLUSH IT IMMEDIATELY WITH FLOWING WATER FROM THE EYE WASH IN THE SINK FOR 15-20 MINUTES.
- Never wear shorts or open-toed shoes. Shoes must cover the entire foot no canvas, sandals, or clog type shoes may be worn. Your clothing should be as protective and safe as possible. The clothing layer can protect your skin from contact with chemicals. Loose or large sleeves should be avoided, since they may accidentally drop into chemicals or the flame of a burner.
- 3. Long hair should be tied back.
- 4. You should bring in non-latex gloves to be worn in the laboratory. Aprons will be available on the first day of lab. If you wish to use one, please take one and keep it in your drawer for the remainder of the semester.

Know the Laboratory Safety Equipment:

- 5. Know the location of the **fire extinguisher**, fire blanket, safety shower, and eye wash. Your instructor will demonstrate their use.
- 6. Acid spills should be neutralized with sodium bicarbonate and then water.
- 7. Base spills should be neutralized with boric acid and then water.
- 8. Report any injuries, even minor ones, to your instructor.

Handle Chemicals Safely:

- 9. Never taste any chemicals in the laboratory. All substances should be treated as toxic.
- 10. Never pipette with your mouth. Always use a rubber bulb or pipette pump.
- 11. <u>Never look down into the open end of a heated test tube</u> or point the open end toward yourself or a neighbor. The contents may erupt and cause serious burns.
- 12. Never return unused chemicals to the reagent bottles. (continued on other side)

13. To avoid possible contamination, do not insert medicine droppers or pipettes into reagent bottles. Instead, pour a little of the reagent into a small beaker.

Handle Chemicals Safely (continued):

- 14. Carefully check the label on each reagent bottle twice to be sure you have the correct reagent. The names of many substances appear similar at first glance.
- 15. Smelling a solid, liquid, or gas should be done only if required in the experiment. Fan the vapors toward your nose with your hand. **Do not breathe a chemical directly.**
- 16. NEVER add water to concentrated acids. ALWAYS add the acid to water. Adding water to a concentrated acid can cause splattering of the acid and result in serious burns.
- 17. Dispose of waste only as directed by your instructor. Do not put any chemicals down the drain.

Observe Safe Laboratory Behavior:

- 18. Perform no unauthorized experiments.
- 19. Do not eat or drink in the laboratory. You can accidentally ingest chemicals with the food. College regulations do not permit eating or drinking in laboratories regardless of whether or not a class is in session. Wash your hands immediately upon leaving the laboratory.
- 20. Laboratory safety is the mutual responsibility of all persons in the laboratory. Your lab work must be taken seriously and <u>"horse-play" is forbidden</u>.
- 21. No personal items (coats, bags, boots, books, etc.) should be stored on the lab benches or counters near the lab benches. They should be on the rack provided at the back of the room.

Clean Up After Yourself:

- 22. Each student is responsible for their lab drawer and its contents. At the end of the semester each drawer will be checked to make sure it is in order and all contents are CLEAN and ready for use for the next semester.
- 23. Return reagents and equipment to their original place when you are done with them.
- 24. Before returning shared glassware, wash it and remove all labels.
- 25. If you spill something, clean it up immediately.
- 26. <u>THE FINAL TEN MINUTES OF LAB SHOULD BE SPENT CLEANING THE ENTIRE LAB, RETURNING</u> REAGENTS AND EQUIPMENT TO THE PROPER PLACE, AND WASHING BOTH GLASSWARE AND WORK <u>AREAS.</u>

Carry out all experiments in accordance with these general regulations and any special instructions given by your instructor in pre-lab discussion. If you fail at any time to obey the instructions or violate safety regulations, such as wearing goggles, long pants, and close-toed shoes, your instructor may ask you to leave the laboratory. You will not receive repeated warnings.

Drawer # _____

I have read, have had an opportunity to ask questions about, and understand the Chemistry Safety Regulations and Laboratory Requirements. I will observe them in my laboratory class. By signing this, I acknowledge receipt of a copy of these regulations and requirements. I have informed by instructor of any health condition that might affect my performance in the laboratory.

	SIGNATURE		
Name (print):		Date:	CRN:
Address:			
College ID #:			
Telephone Number:		Major:	
Emergency contact person:			
Telephone Number:			

NOTE: Must complete and return this signed copy to your instructor; retain the safety regulations in your laboratory not

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Equipment Checklist

General Chemistry

INDIVIDUAL DRAWERS

Item	Required	Needed at Check-In	Needed at Check-Out	Item	Required	Needed at Check-In	Needed at Check-Out
Beaker, 50 mL	1			Evaporating dish	1		
Beaker, 100 mL	1			Watch glass	1		
Beaker, 250 mL	1			Clay triangle	1		
Beaker, 400 mL	1			Wire gauze	1		
Beaker, 800 mL	1			Funnel	1		
Erlenmeyer flask, 50 mL	1			Scoopula or spatula	1		
Erlenmeyer flask, 125 mL	1			Stirring rod	1		
Erlenmeyer flask, 250 mL	1			Test tube holder	1		
Graduated cylinder, 10 mL	1			Test tube rack	1		
Graduated cylinder, 50 mL	1			Small test tubes	5		
Droppers	4			Medium test tubes	12		
Crucible	1			Med/large test tube brush	2		
Crucible Lid	1			Sponge	1		

ONLY THE ABOVE ITEMS SHOULD BE PLACED IN INDIVIDUAL DRAWERS!

COMMUNITY DRAWER AND CABINET

The Community Drawer is located at the bottom of each lab bench. Only those items listed below should be placed in this drawer. The Community Cabinet is in the center of each lab bench with equipment labels on the outside.

Drawer						
ltom	Poquirod	Needed at	Needed at			
пен	Required	Check In	Check Out			
Buret Clamps	2					
Beaker Tongs	2					
Crucible Tongs	2					
Clamp Holders	6					
Extension Clamps—small	min 2					
Extension Clamps—large	min 2					
Thermometer Clamps	2					
Gas Lighters—old style	1					
Gas Lighters—new style	1					

Cabinet						
ltem	Required	Needed at	Needed at			
item	nequireu	Check In	Check Out			
Ring Stand	2					
Bunsen Burner	2					
Iron Rings	2					
Metal Water Bath	1					

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GLASSWARE & EQUIPMENT: INDIVIDUAL DRAWER

Beaker	Clay Triangle	Crucible	Dropper
400mi 300 300 300 300 300 300 300 300 300 30			
Erlenmeyer Flask	Evaporating Dish	Funnel	Graduated Cylinder
Scoopula or Spatula	Stirring Rod	Test Tube	Test Tube Brush
	(with Rubber Policeman)		C
Test Tube Holder	Test Tube Rack	Watch Glass	Wire Gauze

EQUIPMENT: COMMUNITY DRAWER & CABINET

Beaker Tongs	Bunsen Burner	Buret Clamp
Crucible Tongs	Extension Clamp	Thermometer Clamp
		and the standard
Gas Lighter – Old Style	Gas Lighter – New Style	Ring Stand
Iron Ring	Clamp Holder	

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Organic Chemistry Laboratory Checklist

Name:_____

Drawer #_____

Glassware		CHECK CHECK IN OUT Miscellaneous Equipment		ipment	CHECK IN	CHEC K OUT	
Item	#	#	#	Item	#	#	#
	required	missing	missing		required	missing	missing
50 mL Beaker	1			Forceps	1		
100 mL Beaker	1			Scoopula	1		
250 mL Beaker	1			Spatula	1		
400 mL Beaker	1			Stirring rod, glass	1		
800 mL Beaker	1			Watch Glass	1		
10 mL Grad. Cylinder	1			Test Tube Clamp	1		
50 mL Grad. Cylinder	1			Filter Cone, large	1		
25 mL Erlyn. Flask	3			Filter Cone, small	1		
50 mL Erlyn. Flask	3			Pipette Bulbs	2		
125 mL Erlyn. Flask	1			Rubber Tubing	1		
250 mL Erlyn. Flask	1			Sponge	1		
125 mL Filter Flask	1			T.T. Brush, large	1		
250 mL Filter Flask	1			T.T. Brush, small	1		
Test Tubes, large	10			Filter Paper, small	1 Box		
Test Tubes, small	4			Filter Paper, med.	1 Box		
Test Tube Rack	1			Filter Paper, large	1 Box		
Funnel, glass	1						
Funnel, plastic	1						
Büchner Funnel, large	1						
Büchner Funnel, small	1						
Student's Initials*				Student's Initials*			
Instructor's Initials				Instructor's Initi	als		

*By initialing above, you are indicating that the drawer was thoroughly checked and understand that it is your full responsibility to insure that <u>ALL</u> items are accounted for and clean at the end of the semester (during check out). Rev. 4

Microscale Glassware Checklist Craig Tube (recrystallization setup) 5 mL Conical 10 mL Round Bottom 3 mL Conical Vial Hickman Still Condenser Item Vial Flask Picture # required (price) 1 (\$76.90) 1 (\$66.47) 1 (\$23.46) 2 (\$24.04) 1 (\$24.04) 1 (\$24.50) Check # missing In Check # missing Out

	Item	Claisen Adapter	Thermometer Adapter	Magnetic Stir Bar	Cap with septum(large)	O-ring (large)	Cap with septum (small)	O-ring (small)
	Picture	14/10		0 9		0	8	0
	# required (price)	1 (\$54.95)	1 (\$33.06)	1 (\$10.47) either	7 pairs	7	1 pair	1
Check In	# missing							
Check Out	# missing							

	Check In	Check Out	
Student's Initials*			* By initialing to the left, you are indicating that the drawer was thoroughly checked and understand that it is your full responsibility to insure that ALL items are accounted for and
Professors Initials			clean at the end of the semester (during check out).

















NOTE: Emergency shut-off valve located in room 204 ceiling

MONTGOMERY COLLEGE TAKOMA PARK CAMPUS CHEMISTRY DEPARTMENT

Weekly Emergency Eye Wash Station Inspection:

Lab: _____ Tech: _____ Semester: _____ Date: _____

Protocol:

- 1. Test-operate value(s) each week.
- 2. Check for leaks/clog/rubber gaskets.
- 3. Report malfunctions immediately.

Emergency Eye Wash Instructions:

- 1. Turn on the water valve(s).
- 2. Activate the eyewash by pulling the diverter pin towards you to ensure that the eyewash is working properly.
- 3. Flushing of the eyes ~15 minutes.
- 4. Keep your eyelids open by using your hands to ensure adequate flushing of the eyes (eyewash unit will stay on so your hands are free).
- 5. Contact emergency services at 71600.
- 6. Complete an accident report as soon as possible.

Week #	Date	Initial	Function/Leak Check (P/*F)	Comments
1				
2				
3				
4				
5				

Note:

P = Pass; *F = FAILED

*Action to be taken - repairs as needed/order new set

	Reviewed by Lab Coordinator:		Date:
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BEFORE YOU LEAVE THE LAB PLEASE MAKE SURE:

1. All hot plates and other electrical equipment have been turned off and unplugged. Balances should be turned off but they can remain plugged in.

- 2. Extra glassware is returned CLEAN AND WITHOUT LABELS!
- 3. Chemicals are placed at the end of each bench.

4. <u>STUDENTS HAVE PUT AWAY ALL MATERIALS AND CLEANED</u> <u>THEIR AREA.</u>

- 5. WINDOWS ARE CLOSED.
- 6. General equipment is returned to the proper place.
- 7. Gas jets are turned off (check even if not used during your lab!)

8. DI water bottles have been refilled. ****ALL DOORS SHOULD BE <u>CLOSED</u> & <u>LOCKED</u>**** AND ALL LIGHTS (including in the hood) SHOULD BE OFF.

ACCIDENT REPORT

MONTGOMERY COLLEGE SILVER SPRING/TAKOMA PARK CHEMISTRY

***ALL ACCIDENTS SHOULD BE REPORTED TO <u>SECURITY</u> AT 71600. THEY ARE THE				
TRAINED FIRST RESPONDERS***				
DATE				
CLASS:				
INSTRUCTOR:				
1. Full name of person involved in the accident				
2. Injured person's home address				
 3. Gender: 4. Accident Date: Time: 5. Nature of the injury (be as specific as possible): 				
6. Location of accident:				
7. What was the injured person doing at the time of the accident?				

8. What equipment or chemical was involved in the accident?

(OVER)

9. Was the injured person involved in an unsafe act at the time of the accident?

10. Describe the accident:

11. Describe the course of action following the accident, e.g., medical attention, etc.

12.	Report prepared
by:_	· · ·

STUDENT'S SIGNATURE:__

INSTRUCTOR'S SIGNATURE:

Montgomery College Chemical Waste Inventory/Labs Takoma Park - Phys. Science August 16, 2017 (SS-II 2017)

SN301 Contact Person: Terry Patamawenu (x71464) – carts are in SN303

Container Number	Waste Type	% Composition	Volume Collected	Date
1.	B2	40% Potassium Nitrate 20% Silicon Carbide 20% Copper Sulfate 10% 6M Nitric Acid 10% Ammonia	1 Liter	7/12/17
2.	B3	Equal amounts: Nickel Chloride, Potassium Chloride, Sodium Tetraborate, Sucrose, Calcium Carbonate, Barium Chloride, Sodium Carbonate, Alum, 6M Nitric Acid, Sodium Molybdate, Calcium Sulfate, Magnesium Sulfate, Magnesium Sulfate, Sodium Chromate	1 Liter	7/13/17
3.	B5	20% Iron(II) Ammonium Sulfate 20% Ammonium Sulfate 10% 6M Sulfuric Acid 5% Phosphoric Acid 45% Potassium Permanganate	1 gallon	6/8/17
4.	B5	20% Iron(II) Ammonium Sulfate 20% Ammonium Sulfate 10% 6M Sulfuric Acid 5% Phosphoric Acid 45% Potassium Permanganate	1 gallon	6/8/17
5.	B5	20% Iron(II) Ammonium Sulfate 20% Ammonium Sulfate 10% 6M Sulfuric Acid 5% Phosphoric Acid 45% Potassium Permanganate	1 gallon	7/19/17
6.	B7	25% of each: 1-Chlorobutane, 2-Butanone, Ethyl Acetate, 2-Propanol	500 mL	7/20/17

7.	D2	Multivitamin pills:	1 gallon	6/20/17
		50% Iron Solution (0.04 mg/mL)		
		20% Sodium Citrate Solution		
		10% Hydroquinone Solution (1%)		
		10% 1,10-Phenanthroline Solution in		
		Ethyl Alcohol		
		10% 6M Hydrochloric Acid		
8.	D2	Multivitamin pills:	1 gallon	6/20/17
		50% Iron Solution (0.04 mg/mL)		
		20% Sodium Citrate Solution		
		10% Hydroquinone Solution (1%)		
		10% 1,10-Phenanthroline Solution in		
		Ethyl Alcohol		
		10% 6M Hydrochloric Acid		
9	D2	Multivitamin pills:	1 gallon	7/31/17
0.		50% Iron Solution (0.04 mg/mL)		1101111
		20% Sodium Citrate Solution		
		10% Hydroquinone Solution (1%)		
		10% 1,10-Phenanthroline Solution in		
		Ethyl Alcohol		
		10% 6M Hydrochloric Acid		
10	רי רי	Multivitamin pills:	1 gallon	7/31/17
10.	02	50% Iron Solution (0.04 mg/mL)	_	1101111
		20% Sodium Citrate Solution		
		10% Hydroguinone Solution (1%)		
		10% 1,10-Phenanthroline Solution in		
		Ethyl Alcohol		
		10% 6M Hydrochloric Acid		
11	B9	35% Equal amounts: 0.1M Nitrates	1 gallon	8/1/17
•••		(Barium, Strontium, Calcium, Magnesium),	· gallon	5,,,,,,
		0.1M Sodium Bromide, Sodium Chloride,		
		Sodium Iodide, 1M Sodium Carbonate, 1M		
		Ammonium Oxalate		
		10% of each: Bromine Saturated Water.		
		Chlorine Saturated Water, Iodine Saturated		
		Water,Hexane		
		5% of each: 0.1M Strontium Chloride,		
		Magnesium Bromide, Barium Chloride,		
		Calcium Iodide, Strontium Bromide		

Purpose

- The Chemistry Department at Montgomery College, Takoma Park Campus (TPSS), Silver Spring, MD, has developed this Chemical Hygiene Plan (CHP) such that a safe work environment exists in the laboratories and associated areas for students, faculty and staff. This CHP is intended to provide the necessary work practices to promote a culture of safety within the Department.
- This Plan is intended to satisfy the requirements of the US Department of Labor, Occupational Safety and Health Administration (OSHA) 29 CFR 1910.1450 "Occupational Exposures to Hazardous Chemicals in Laboratories."

General Principles

- This document applies to all Chemistry Department Labs in which chemicals are used at any time. A chemical is defined as "A substance with a distinct molecular composition that is produced by or used in a chemical process." <u>http://www.thefreedictionary.com/chemical</u>
- To promote a culture of safety within the Chemistry Department, Instructional Faculty, Staff and students shall follow the Chemical Hygiene Plan.
- Laboratory facilities within the Department of Chemistry shall be used only by persons with proper safety training. The number of students assigned to each laboratory shall not exceed the number of laboratory stations available.
- Only students enrolled at Montgomery College in the specified Chemistry course may participate in laboratory exercises. The only exception to this is sponsored activities approved in advance by the Chemistry Department Chair or their designated approver.
- Undergraduate labs must have a staff member or professor trained in chemical safety present in the lab at all times when they are conducting experiments or when chemicals are present in the lab.
- Faculty, staff, and students will follow general precautions for handling all laboratory chemicals to minimize all chemical exposures. OSHA's Permissible Exposure Limits (PEL) and the Threshold Limit Values (TLVs) (as available on the Safety Data Sheets) shall not be exceeded. Assume that any mixture is as toxic as its most toxic component and that unknown substances are hazardous.
- Faculty, staff, and students shall not underestimate the risk of exposure. Exposure to hazardous substances shall be minimized. The decision to use a particular substance will be based on the best available knowledge of each chemical's particular hazard as well as

the availability of proper handling facilities and equipment. Substitutions, either of chemicals or experiments, shall be made where appropriate to reduce hazards without sacrificing instructional objectives. When the risk outweighs the benefit and no substitute is available, the experiment, procedure, or chemical shall be eliminated.

 All chemicals accepted from a supplier shall have its corresponding SDS on file with Environmental Safety and a hard copy must be available in the teaching lab where it is being used as well as a central location. All SDSs shall be accessible to employees at all times in the Chemistry Department in the General Chemistry stockroom located in SN 301.

I. STANDARD OPERATING PROCEDURES

A. Laboratory Procedures

- 1. Individuals in Laboratories
 - a. Food and drink, gum chewing, application of cosmetics, or manipulation of contact lenses is not permitted anywhere in the Chemistry Labs at any time. Students should wash their hands at the conclusion of a lab exercise. Hand soap and paper towels are provided.
 - b. Employees shall not work alone in the lab or chemical storage areas unless other employees are in the vicinity and are aware that someone is in the laboratory.
 - c. Students shall never be left unattended in any laboratory. If the instructor needs a short break, he/she must arrange to have one of the designated stockroom staff step in to oversee the safety of the students while the instructor is out. At no time is this staff member allowed to teach or guide the students except to correct safety violations.
 - d. Each student is responsible for the proper care of equipment they are using. Any damage to, or loss of, equipment should be reported to the instructor and, if feasible, replaced immediately.
 - e. Spillage of any concentrated solutions or large amounts of solutions mustbe reported to the instructor and/or Lab Coordinator immediately.
 - f. All personal injury accidents, regardless of nature or severity, must be reported to the instructor and/or Lab Coordinator immediately. An accident form must be filled out by the lab instructor and turned into the Lab Coordinator.
 - g. Unauthorized experiments are prohibited. No materials, equipment or chemicals may be used in any way not described in the lab manual or written procedure. Chemicals and/or equipment may not be removed from the lab.
 - h. The quantities of flammable liquids used in the laboratories shall not exceed the amount that can be consumed in the current experiment.
 - i. Chemical materials shall be stored only in the chemical preparation and storage areas. Quantities of chemicals sufficient for the current experimentare

permitted in laboratories only when properly labeled with the name of the chemical, the CAS#, the date of preparation, and the preparer's initials.

- j. Eye protection is required for everyone at all times in the laboratory or associated equipment rooms. Regulation safety goggles (ANSI approved for splash and E-Z87+ high impact standard), are the only acceptable goggles in the Montgomery College, Takoma Park Campus, Chemistry labs.
- k. The area at the front of the laboratory hoods must be kept clear of obstructions at all times. Stools, backpacks, and other objects must remain in their designated areas.
- In labs where Bunsen/Tirrill burners are used, it is the responsibility of the faculty member instructing a laboratory class or session to check that knobs to gas spigots/connections are turned off at the end of their respective class sessions. Laboratory Coordinator or designated laboratory staff member is responsible for checking gas knobs, at least, at the end of his/her workday. Lab Coordinator or staff member will be responsible for inspecting these at least once every semester and before a long break.
- 2. Students in the Laboratory
 - a. Each student enrolled in a laboratory course at Montgomery College, Takoma Park Campus, Chemistry Department shall receive a copy of: Chemistry Laboratory Safety Regulations and Requirements, Equipment Checklist, Student Emergency Contact Form. Each student shall sign the Safety Agreement attached to the Student Emergency Contact Form before performing any experiments.
 - b. Students shall read lab directions ahead of time and follow all verbal and written instructions.
 - c. Students shall perform only authorized experiments
 - d. Students shall wash their hands at the conclusion of a lab exercise. Hand soap and paper towels will be provided
 - e. Students shall dress appropriately for lab. Tops with sleeves and that cover the midriff are required. Pants/skirts that cover the legs to the knee or longer are required. No sandals, open toed shoes, or clogs are allowed. Shoes must fully cover the feet.
 - f. Long hair must be tied up or otherwise confined.
 - g. Students shall report all accidents, injuries, chemical spills, glass breakage, or equipment malfunctions to the instructor at once, no matter how trivial they may seem. For all accidents or injuries an injury/accident report must be obtained from the professor and filled out immediately. Once the report is properly filled out it should be turned into the Lab Coordinator or a designated staff member.
 - h. Students shall only work in any laboratory under the direct supervision of an instructor or designated staff member.

B. Magnetic Fields

Magnetic fields, such as those enclosed within the 60 MHz NMR, in SN 304B, are a source of possible risk to some individuals working in the vicinity of these instruments. Users should be aware of the potential risks prior to using the 60 MHz NMR.

C. Housekeeping Practices

- 1. Individuals in the Laboratory
 - a. All laboratory areas must be kept clean and contain only those items needed for the immediate task at hand.
 - b. All chemical hazardous waste must be placed in appropriate, segregated solid/liquid waste containers that are properly labeled including needles into red sharp container provided.
 - c. Sinks are to be used only for disposal of water and designated solutions. Other solutions must be placed in the appropriate labeled wastecontainer.
 - d. Lab benches must be wiped down at the end of each lab activity.
 - e. All chemical spills shall be cleaned up as soon as they occur. Chemicals and the cleanup materials used should be disposed of as directed by the professor.
 - f. Access to hoods, emergency equipment, telephones, safety showers, eyewashes, or exits shall not be physically blocked at any time.
 - g. Chemicals and equipment shall be properly stored in their designated areas.
 - h. All cabinets and drawers should be kept closed when not in use to avoid catching and bumping hazards.
 - Only lab instructions, lab notebooks, calculators, and writing instruments should be in the work areas. All backpacks and personal items shall be stored in the designated areas
 - j. Operating hot plates, running water, open flames, or chemical reactions and processes shall never be left unattended.

D. Chemical Procurement

- 1. To avoid the accumulation of excess chemicals, chemicals shall be ordered in quantities that are likely to be consumed in one year and should be purchased only in the quantity sufficient for the planned use.
- 2. No chemical will be accepted from suppliers without the SDS and an adequate identifying label.
- 3. When a chemical is received, proper handling, storage and disposal must beknown. For all new hazardous chemicals, the SDS shall be reviewed for safety in used areas.
- 4. When a chemical is received it shall be marked with the date it is received and it must be entered into Chemical Inventory before it is stored.
- 5. Donated chemicals should be accepted only after approval is obtained from the Laboratory Coordinator. It should be established that the donated chemical is in excellent condition, that an appropriate SDS is available, and that there is a

specific use for the donated material.

E. Chemical Storage and Distribution

- 1. All chemicals must be within tightly closed, sturdy and appropriate containers.
- 2. If a chemical has been transferred to a secondary container, the new container must be appropriately labeled. The label should contain the name of the chemical, the corresponding CAS#, the date the secondary container was filled and the initials of the person who filled the secondary container.
- 3. Chemicals shall be stored based on the reactive nature and compatibility group of the chemical, i.e. organics separated from inorganics, acids separated frombases, and flammables separated from oxidizers.
- 4. Large containers (over 2.5 L) shall be stored in SS 128 (solvent storage on the first floor of Science South Building). Flammable chemicals shall be stored in approved storage containers and in approved flammable chemical storage cabinets.
- 5. All chemical storage areas should be securely locked when not in use. Storage and prep areas should be accessible only to those persons authorized to use the chemicals.
- 6. Chemicals should not be transferred to other areas of the college without prior approval of the Lab Coordinator or his/her representative. Chemicals should not be transferred without simultaneous transfer of the corresponding SDS and corresponding update of the Chemical Inventory.
- 7. Refrigerators (explosion proof), in SN 303, used to store chemicals must be suitable for flammable storage and may not be used for storage of food, drinks, or other items intended for human consumption.
- 8. Chemicals transported in elevators shall be protected from breakage and carried in secondary containers that will contain spills. The elevator should not be used by the public during transportation of significant quantities (over 500 mL) of chemicals.
- 9. Compressed Gases
 - a. A compressed gas is defined as any material or mixture having in the container either an absolute pressure greater than 276 kPa (40lb/in²) at 21°C or an absolute pressure greater than 717 kPa (104 lb/in²) at 54°C or both, or any liquid flammable material having a Reid vapor pressure (RVP) greater than 276 kPa (40 lb/in²) at 38°C.
 - b. Gas cylinders should only be moved from one location to another with the protective cap securely in place. Cylinders should be moved or transported only with the appropriate gas cylinder cart. They should never be carried or rolled.
 - c. Both full and empty cylinders may only be stored where they can be securely restrained by straps, chains, or a suitable stand.
 - d. A cylinder shall be considered empty when there is still a slight positive pressure and an "empty" label is placed on it.
 - e. An empty cylinder shall be returned to the supplier as soon as possible after

having been emptied or when it is no longer needed.

- f. Cylinders should not be exposed to temperatures above 50°C.
- g. Flammable gases must be stored separately from oxidizing gases.

F. Waste Minimization and Disposal

- 1. Montgomery College Environmental Safety Officer is responsible for coordinating all waste pickups by the hazardous waste contractor. Pickups are normally scheduled fourtimes each year and whenever necessary for special projects.
- 2. Hazardous Waste (HZW) is any material that is to be discarded AND contains certain regulated components or is flammable, corrosive, reactive, and/or toxic to the environment. These characteristics are defined in 40 CFR Part 261.22 as follows:
 - a. Flammable A liquid (other than an aqueous solution containing less than 24% alcohol by volume) with a flash point of less than 60° C (140° F) as determined by a Pensky-Martens closed cup tester using ASTM method D-93-70 or D-93-80; or it is not a liquid and is capable under standard temperature and pressure of causing a fire; or it is an ignitable compressed gas; or it is an oxidizer.
 - b. Corrosive An aqueous waste having a pH </= 2 or >/= 12.5; or a liquid that corrodes steel as described in 40 CFR Part 261.22.
 - c. Reactive A material that is normally unstable and readily undergoes violent change without detonating; or reacts violently with water; or forms potentially explosive mixtures with water; or when mixed with water, generates toxic gases, vapors, or fumes; or a cyanide or sulfide bearing waste that generates toxic gases, vapors, or fumes when exposed to pH conditions between 2 and 12.5; or is capable of detonation or explosive reaction.
 - d. Toxicity Using the test procedure specified in 40 CFR Part 261.24, an extract of the material contains one or more constituents at concentrations in excess of those specified in Table I of 40 CFR Part 261.24. (These are heavy metals or specific organic compounds that could be released into ground water.)
 - e. Listed Wastes The EPA and MDE have identified several hundred chemicals and solid wastes by name as hazardous. Waste that appears on any of these lists must be handled as hazardous waste.
 - f. Select chemicals carefully. Know the hazards associated with each and how to handle and store them safely. This information can be found on the Safety Data Sheet (SDS) that is required for every hazardous material.

- g. Purchase only amounts that are expected to be used in the foreseeable future.
- h. Follow the College waste minimization program. Investigate alternative materials and, if feasible, scale back experiments or other activities to use
- i. the smallest amount of hazardous materials possible.
- j. Develop a Standard Operating Procedure for identifying, segregating, collecting, and labeling all hazardous wastes.
- k. Hazardous waste shall not be stored in satellite areas longer than 4 months (120 days).
- I. Keep the waste in closed containers that are compatible with their contents. (No hydrofluoric acid in glass, for example.) Often the original container is acceptable. Containers must remain closed except when adding waste. Do not leave funnels in the containers between additions. Do not overfill containers. Allow some headspace for expansion of the contents. Use appropriately sized containers.
- m. Properly label the container with the following:
 - 1. The words "Hazardous Waste."
 - The name(s) of the material(s) included in the waste. The name of a particular material may be: (1) *the process that created the waste* (e.g., "Waste acid from copper etching" or "Waste products from Experiment X"), or (2) *the manufacturer's name and product number* (e.g., "Ace Cleaner #199"), or (3) *the known components of mixtures* (e.g., "10% battery acid" or "50% antifreeze/water")
- n. Do not mix solid and liquid waste.
- o. Do not dilute wastes.
- p. Do not mix heavy metal solutions with any organic solvent or solution.
- **q.** Do not pour halogenated and non-halogenated organic solvents into the same container.
- r. Avoid placing wastes from incompatible hazard classes in the same container (e.g., flammables with oxidizers).
- s. Maintain containers of hazardous waste in the designated storage area prior to transfer to SN303. This area must be controlled by the personnel generating the waste.
- t. As in any chemical storage area, segregate the containers according to the

type of waste. Provide secondary containment in storage of Hazardous Waste.

u. The following materials require special handling by the generator prior to their disposal

1. Aerosol Cans: Pressurized spray cans must have their original content label and/or MSDS available at the time of pickup. Empty cans are not hazardous wastes and can be put into regular trash.

2. Batteries: Spent batteries are considered a hazardous waste.

3. Gas Cylinders: Gas cylinders have a high disposal cost. Cylinders shall be purchased from vendors who will accept them back after use.

4. Empty Containers/Glassware: Most glassware can be disposed of in broken glass boxes that are available in all labs. Containers that held acutely toxic hazardous waste must be triple rinsed before being placed in the broken glass box. The rinsate from this process must be collected and handled as a hazardous waste.

v. Federal and State regulations specifically prohibit the transportation, storage, and disposal of unknown waste materials. Consequently, unknown chemicals need to be tested and analyzed for hazardous characteristics prior to disposal. All hazardous materials and wastes must be properly identified when accumulation begins. Students, faculty, or staff shall not be permitted to use or leave unidentified materials on Montgomery College property.

G. General Laboratory Procedures

- 1. Spills
 - a. Do not attempt to respond to any spill if you are not familiar with the material and its hazards or if there is a risk of fire, injury, explosion, suffocation, or toxic atmosphere. Such situations must be reported to MC Public Safety (x71600) or local emergency responders.
 - b. If the chemical involved in the spill is judged to present an immediate hazard, evacuation is to be absolute and the area shall be isolated until Public Safety is contacted and a HAZMAT arrives on the scene.
 - c. Depending on the spilled material, its quantity, and equipment available, employees who work with the chemical and understand its hazards mayclean up incidental spills that do not pose a danger to health. Facilities staff, including janitors, are not trained in chemical spill response and may not be contacted to

cleanup chemical spills. Janitorial staff are trained in Blood Borne Pathogens prevention and can assist with cleanup of blood or body fluids.

- d. If hazardous vapors are present and there is an air evacuation system nearby, activate the system. In all cases, evacuate the area, pull the fire alarm to inform others, and inform Public Safety.
- e. If there is no immediate danger (risk of fire, injury, explosion, suffocation or toxic atmosphere to personnel), containment should be accomplished by use of spill pillows, towels, rolls, or other devices that will keep the spill from spreading.
- f. If there is no immediate danger, cleanup procedures from the SDS should be followed. Appropriate personal protective equipment shall be used during cleanup.
- g. If the spilled material is a hazardous chemical, all of the materials involved in the cleanup shall be considered hazardous waste and must be disposed of as such.
- h. If a major spill occurs (cannot be cleaned up safely by the individual) cleanup shall only be undertaken by individuals who are trained in HAZMAT procedures.
- 2. Personal Protective Equipment
 - a. It is the responsibility of the college to provide appropriate safety and emergency equipment for employees and students with the exception of student goggles. Students must supply their own ANSI approved-forsplash goggles. No student will be allowed to work in the laboratory without department-approved goggles. No student shall borrow goggles from Montgomery College or its representative.
 - b. All eye protection devices used in the Chemistry Department shall conform to ANSI Standard Z87.1-2003. All goggles must be indirectly vented to protect from splash.
 - c. Protective apparel shall be compatible with the required degree of protection for the substances being handled.

II. ADMINISTRATIVE CONTROL MEASURES

A. Inventory Control

- The chemical inventory shall be updated each time a chemical is received or consumed. This list must be audited for accuracy at a minimum of once a year.
- 2. The chemical inventory list shall contain the following information about

each chemical found in the Chemistry Department: The chemical name, CAS#, name of the supplier, re-order #, amount purchased, location of storage, received date, and corresponding SDS #.

3. Every area in which chemicals are stored shall have an up-to-date chemical inventory available

B. Hazard Identification and Labels

- 1. Labels on incoming containers of chemicals are not to be removed or defaced.
- 2. Date of Receipt of incoming containers of chemicals shall have the received date printed on a separate label and placed on the container so as not to cover any part of the original label.
- 3. Chemicals stored in their original bottles shall have the manufacturer's original label identifying potential hazards shown in pictograms.
- 4. If a chemical has been transferred to a secondary container, the new container shall be appropriately labeled with the chemical name, concentration (if in solution), solvent (if in solution), date of transfer, and initials of the person responsible for the transfer.
- 5. Unlabeled bottles should not be opened and such materials shall be disposed of promptly as outlined in the section on disposal procedures.

C. Signage

- 1. Emergency telephone numbers shall be posted in all laboratory areas. These lists shall be updated each semester or as needed.
- 2. Signs shall be used to indicate the location of exits, evacuation routes, safety showers, eye washes, first aid kits and other safety equipment.

D. Safety Data Sheets (SDS)

- 1. Each SDS received with incoming shipments shall be maintained and made readily available to laboratory employees, professors, students, and staff.
- 2. Each chemical stored in the Chemistry Department shall have its corresponding SDS on file with Environmental Safety.
- 3. A SDS for each compound on the chemical inventory shall be available in the department, except for those chemicals that predate the laboratory standard.

E. Records

- 1. Chemical inventory records
 - a. An inventory of all chemicals shall be maintained regularly.

b. The Lab Coordinator or his/her appointed delegate shall retain and maintain the chemical inventory.

c. A physical inventory of all chemicals listed on the inventory spreadsheet shall be performed annually.

2. Inspection records

a. Safety showers and eye-washes shall be tested monthly by Chemistry Department appointed staff. Safety equipment shall be tagged and signed by the person performing the testing.

b. The Lab Coordinator shall maintain records indicating the regular testing of safety equipment

3. Training records

a. Safety training records shall be maintained by the Lab Coordinator for Staff and by the Department Chair for faculty (part and full time).

4. Incident reports

a. Incident reports must be filled out for each incident in the Chemistry Department laboratories. These reports are to be maintained by the Lab Coordinator and Safety Officer, Takoma Park Campus.

F. Exposure Monitoring

- All volatile materials shall be used inside fume hoods. If there is a reason to believe that exposure levels for a regulated substance have exceeded the action level or permissible exposure limit, Environmental Safety shall ensure that the employee or student exposure to that substance is measured.
- 2. Factors which may raise the possibility of overexposure and therefore warrant an initial measurement of employee or student exposure include:
 - b. The manner in which the chemical procedures or operations involving the particular substances are conducted.
 - c. The use of a procedure that involves significant quantities or is performed over an extended period of time
 - d. There is reason to believe that an exposure limit may be exceeded.
 - e. Signs or symptoms of exposure by employees or students such as skin or eye irritation, shortness of breath, nausea or headache.
 - f. If a substance has an exposure monitoring requirement and if there is

reason to believe that exposure levels for that substance routinely exceed the PEL, Montgomery College shall measure the employee or student exposure to the substance.

- g. If the initial monitoring finds employee/student exposure over the PEL, MC shall immediately comply with the exposure monitoring provisions of the relevant standard for that substance.
- h. Montgomery College shall, within 15 working days after the receipt of any monitoring results, notify the employee/student of these results in writing or by posting the results in an appropriate location that is accessible to employees.
- The following substances are regulated by OSHA standards and require monitoring (29CFR subpart Z) Asbestos, 13 carcinogens, ionizing radiation, methylene chloride, 1,3- butadiene, Methylenedianiline, Formaldehyde, Ethylene oxide, Acrylonitrile, 1,2-dibromo-3chloropropane, Vinyl chloride, inorganic arsenic, lead, Chromium VI, Benzene, blood borne pathogens. (29CFR subpart 3)

G. Safety Committee

- 1. The Safety Committee shall ensure that a safety culture be promoted and maintained within the Takoma Park Chemistry Department
- 2. The Safety Committee shall consist of one part-time faculty, two full-time faculty one lab staff volunteers, the Lab Coordinator, and the Department Chair.
- 3. The Safety Committee shall have responsibilities for
 - i. Attending Safety Committee meetings
 - ii. Promotion of safe work practices and conditions
 - iii. Working towards reduction or elimination of accidents and incidents
 - iv. Reviewing of Policies and Procedures (CHP) and recommending improved strategies

III. SAFETY / EMERGENCY FACILITIES AND EQUIPMENT

A. Equipment

- 1. Montgomery College shall ensure that adequate emergency equipment is available in all laboratories and inspected periodically to ensure that it is functioning properly. All employees working in the laboratories shall be properly trained in the use of each piece of safety equipment.
- 2. Emergency equipment that should be available include:
 - a. Eyewash station
 - i. Each eyewash station will be capable of supplying a continuous

flow of aerated, tepid, potable water to both eyes for at least 15 minutes. The valve must be able to remain in the open position without the need to hold the valve. (ANSI Z358.1 - 1990)

- ii. Eyewash stations shall be located so they will be accessible within 10 seconds (ANSIZ358.1-1990)
- iii. The Lab Coordinator or appointed staff shall be responsible for weekly testing of the eyewash stations (SN 300, 302, 304) on the third floor of Science North and the eyewash in the chemical prep/storage area (SN 301). Eyewash stations will be tagged following each inspection showing the date, inspector and results.
- b. Fire extinguisher of appropriate type
 - Multipurpose fire extinguishers shall be available in each laboratory. A multipurpose, ABC, fire extinguisher that is available in all MC Chemistry labs can be used on all fires EXCEPT for class D fires. Extinguishers shall be visually checked monthly and inspected and tested annually.
 - ii. MC facilities shall be responsible for arranging annual testing of the fire extinguishers on the third floor of the Science center
- c. Safety Shower
 - Safety showers shall be capable of supplying a continuous flow of tepid potable water for at least 15 minutes. The shower shall have a quick-opening valve requiring manual closing. (ANSI Z358.1 – 1990)
 - ii. Safety showers shall be located so they will be accessible within 10 seconds (ANSI Z358.1-1990)
 - iii. The Facility and/or Lab Coordinator or appointed staff shall be responsible for monthly testing of the safety showers on the third floor of Science North building (SN 300, 302, 304) and the safety showers in the prep/chemical storage area (SN 301). Safety showers will be tagged following each inspection showing the date, inspector, and results.
- d. Emergency telephone
 - A telephone shall be readily available everywhere chemicals are stored or used. A current list of emergency phone numbers will be posted next to each phone.
- e. Spill control

i. All laboratories in which hazardous substances are being used shall have a spill control kit tailored to meet the labs potential risk associated with the materials being used. If there is no immediate danger to students or employees, containment can be managed by spill pillows, towels, rolls, inert absorbents, neutralizing agents, or other devices.

B. Facilities

- 1. Fume hoods
 - a. Laboratory fume hoods shall not be used for storage or disposal of chemicals. If a hood must be used for storage as in to provide adequate ventilation for flammable chemicals, it must not be used for laboratory experiments or the transfer of chemicals.
 - b. Laboratory activities that may release airborne contaminants above the PEL or TLV concentrations must be carried out in the fume hood. If laboratory activities produce potentially hazardous vapors or gaseous substances, the activity shall be carried out in the fume hood.
 - c. All fume hoods shall be inspected annually and certified by Environmental Safety or their approved vendor. Any hood not passing inspection must be taken out of service immediately and not be used until such time as the hood has passed inspection. It is the responsibility of Environmental Safety to purchase the parts and replace the unit in a timely fashion so as not to endanger the health and well-being of the student or employee or place the facility at risk.
- 2. Ventilation
 - a. General laboratory ventilation shall not be relied on for protection from exposure to hazardous chemicals. A rate of 4 – 12 room air exchanges per hour shall be the accepted standard when hoods are used as the primary method of control.
 - b. Alteration of the ventilation system shall be made only if testing indicates that the employee/student protection from airbornetoxic substances will continue to be adequate.
- 3. Flammable storage
 - a. Chemicals with a flash point below 93.3 °C shall be considered fire hazard chemicals. Any chemical whose SDS or label states "flammable" shall also be considered fire hazard chemicals.
 - b. Fire hazard chemicals in excess of 500 mL shall be stored in the

flammable solvent storage area on the first floor of Science South building (SS 128), in safety cans, or in storage cabinets designed for flammable materials.

- **c.** When transferring significant quantities of flammable liquids from one container to another, containers shall be properly grounded. Large quantities of flammable chemicals stored outside of cabinets shall be in flame-proof storage cans which conform to NFPA guidelines.
- 4. Electrical
 - a. All electrical outlets shall have a grounding connection accommodating a three-prong plug.
 - b. Ground-fault circuit interrupters shall be installed as required by code.

IV. TRAINING AND INFORMATION

A. Training for Employees

- 1. General
 - a. Montgomery College Environmental Safety shall provide employees with information and training to ensure that they are apprised of the hazards of chemicals present in their work area
 - b. Montgomery College's Environmental Safety Office and the Dean of Chemical and Biological Science (CBS) have determined that all faculty and staff who work in a laboratory must attend Laboratory Safety and Hazard Communication training at the start of their first semester at MC and every three years thereafter.
- 2. The objective of the employee training and information program shall be to assure that all individuals at risk are adequately informed about the physical and health hazards associated with hazardous chemicals present in the laboratory, the proper procedures to minimize risk of exposure, and the proper response to accidents.
- 3. Montgomery College Environmental Safety shall provide right-to-know and Hazard Communication training opportunities for all employees at risk. These training opportunities shall include information about the hazards of chemicals present in the laboratory and sources of information concerning hazards in the laboratory. In particular, the training program shall cover the laboratory standard, Safety Data Sheets, the chemical hygiene plan, and the responsibilities of Montgomery College Environmental Safety as well as those of the employee.

- 4. Employees shall be trained in measures they may take to protect themselves from exposure to hazardous chemicals, including the location and proper use of both protective equipment and emergency equipment.
- 5. All laboratory employees and faculty shall be trained to read and understand SDSs.
- 6. All staff member of the Chemistry Department shall be trained in both labeling and storage practices as outlined in this chemical hygiene plan.

B. Training for Students

- Instruction in laboratory safety shall be provided to all students involved in laboratory activities. No student will be allowed to work in any laboratory without appropriate safety training or without reading and signing a laboratory safety agreement.
- 2. Safety training should include the importance and the content of the label and of safety data sheets. As appropriate, the student should also be introduced to other sources of chemical safety information.
- 3. At the beginning of each semester and prior to laboratory activities, laboratory time shall be devoted to safe laboratory practices and to the student safety agreement.

C. Information

- Employees shall be informed of the content of the "Laboratory Standard", 29CFR part 1910.
- 2. Employees shall be informed of the location and availability of the chemical hygiene plan.
- 3. Employees shall be informed of the location of safety data sheets.
- 4. Employees shall be informed of the location of personal protective equipment and of emergency equipment as outlined in the chemical hygiene plan.

V. **RESPONSIBILITIES**

- A. The Montgomery College President has the ultimate responsibility for chemical hygiene collegewide. The Chemical and Biological Sciences Instructional Dean shall, along with other Facility and Public Safety administrators provide continuing support for collegewide chemical hygiene programs including development and enforcement of the chemical hygiene plan.
- B. The Lab Coordinator is responsible for enforcement of all federal, state and local health safety and environmental regulations and policies including the chemical

hygiene plan. The Lab Coordinator and Faculty members are responsible for enforcement for all department and college policies.

- C. Chemical Hygiene Officer has the responsibility to:
 - 1. Develop and implement the chemical hygiene plan and the safety plan for the department including training, reporting and other functions.
 - 2. Work with administrators, professors, Environmental Safety, and staff to develop and implement the safety program.
 - 3. Ensure that inspections in the laboratory are performed when appropriate and that records of inspections are maintained.
 - 4. Monitor the procurement, use, and disposal of chemicals used in the Chemistry Department's laboratory programs.
 - 5. Provide technical assistance to professors, staff, and employees on the chemical hygiene plan.
 - 6. Ensure that the chemical hygiene plan is reviewed annually and revised as needed so that it is always in compliance with current legal requirements.
 - 7. Determine the need for personal protective equipment beyond that specified for general laboratory use.
 - 8. Implement appropriate training with regard to chemical hygiene for all Chemistry department employees' work locations, including laboratory areas.
 - 9. Ensure that all staff members have received appropriate training.
 - 10. Ensure that employees have access to the chemical hygiene plan, SDSs, and other suitable reference materials.
- D. The Safety Committee and Lab Coordinator are responsible for chemical hygiene programs within the Department of Chemistry. The Lab Coordinator shall monitor compliance with the chemical hygiene plan. The Lab Coordinator is also responsible for enforcement of all federal, state, and local health safety and environmental regulations, which include policies as applicable to the Department of Chemistry.
- E. MC Employees who normally work in a laboratory are responsible for
 - 1. participating in training programs provided by MC.
 - 2. maintaining an awareness of health and safety hazards.
 - 3. planning and conducting each activity in accordance with the Chemistry Departments Chemical Hygiene Plan.
 - 4. consulting reference materials, including SDSs related to chemical safety where appropriate.
 - 5. using and modeling good personal chemical hygiene habits.

- 6. reporting accidents, injuries, unsafe practices, and unsafe conditions.
- F. Students shall practice good personal hygiene habits. They shall report accidents and maintain an awareness of health and safety hazards. Students should conduct all activities according to the chemical hygiene plan.

VI. PARTICULARLY HAZARDOUS SUBSTANCES (PHS)

A. General

- This section of the Chemical Hygiene Plan will describe the specific and general control measures which are designed to reduce the exposure of instructors, staff and students to especially hazardous substances. Employees should read and understand these practices before commencing a procedure using particularly hazardous substances (PHS)
- 2. PHSs include highly toxic chemicals, reproductive toxins and select carcinogens. Montgomery College, Department of Chemistry includes highly flammable chemicals, highly reactive chemicals and highly corrosive chemicals.
- 3. The use of these substances requires prior approval of the Chemical Hygiene Officer.
- 4. PHSs shall be used only in designated areas and within the chemical fume hoods.
- 5. The use of PHSs shall require appropriate treatment of contaminated waste and contaminated areas as determined by assigned personnel.

B. Highly Toxic Chemicals

- When a personal exposure limit (PEL) or threshold limit value (TLV) is less than 50 ppm or 100 mg/m³ the user shall use the chemical in a properly operating fume hood, glove box, vacuum line, or other device equipped with appropriate traps. If none is available, no work shall be performed using the chemical.
- 2. If a PEL or TLV is not available, the animal or human median inhalation lethal concentration (LC50) shall be used as a guideline. If that value is less than 200 ppm or 2000 mg/m³ when administered continuously for one hour or less, then the chemical shall be used in an operating fume hood, glove box, vacuum line, or other device equipped with appropriate traps. If none are available, no work shall be performed using that chemical
- 3. Examples of highly toxic chemicals (acute or chronic) that are used in the Montgomery College Chemistry labs are chloroform, bromine, and carbon tetrachloride.

C. Highly Flammable Chemicals

- 1. Class 1A liquids will be defined as highly flammable chemicals. Class 1A liquids have a flashpoint of less than 73 °C and a boiling point of less than 100 °C.
- 2. Highly Flammable Chemicals shall never be used in the same area as equipment that may produce a spark through arcing or any other method.
- 3. Examples of highly flammable chemicals used in the Montgomery College Chemistry labs are diethyl ether, acetone, pentane, petroleum ether, and acetaldehyde.

D. Highly Reactive Chemicals

- 1. A reactive chemical is one that
 - a. is described as such on the label or in the SDS.
 - b. is ranked by the NFPA as 3 or 4 for reactivity.
 - c. is identified by the Department of Transportation (DOT) as an oxidizer, an organic peroxide, or an explosive (Class A, B or C).
 - d. fits the Environmental Protection Agency definition of reactive in 40CFR 261.23.
- 2. Reactive chemicals shall be handled with all proper safety precautions, including segregation in storage, prohibition of mixing even small quantities with other chemicals without prior approval, implementation of the use of appropriate personal protection, and following all precautions as required.
- Examples of highly reactive chemicals that are used in the Montgomery College Chemistry labs are ammonium dichromate, nitric acid, and hydrogen peroxide (30%).

E. Highly Corrosive Chemicals and Contact Hazard Chemicals

- 1. Corrosive, allergen, and sensitizer information can be found on the manufacturers' SDSs and on manufacturer's labels.
- 2. A corrosive chemical is one that
 - a. fits the OSHA definition of corrosive in 29CFR1910.1200.
 - b. fits the EPA definition of corrosive in 40CFR262.22 (has a pH greater than 12 or less than 2.5).
 - c. is known to be reactive to living tissue, causing visible destruction, or irreversible alterations of the tissue at the site of contact.
- 3. A contact hazard chemical is an allergen or sensitizer that
 - a. is identified as such in the manufacturers SDS or label.
 - b. is identified as such in the medical or industrial hygiene literature.

c. is known to be an allergen or sensitizer.

- 4. Corrosive and contact hazard chemicals will be handled with all propersafety precautions, including the wearing of safety goggles, wearing of appropriate gloves, and wearing of protective clothing.
- Examples of highly corrosive chemicals used in the Chemistry labs at Montgomery College are hydrochloric, sulfuric, nitric and phosphoric acids in greater than 1 molar concentrations as well as potassium hydroxide either solid or in aqueous solution greater than 1 molar concentration.

F. Reproductive Toxins

- 1. A reproductive toxin refers to chemicals which effect fetuses (teratogenesis) and cause chromosomal damage (mutations).
- 2. A reproductive toxin is a compound that
 - a. is described as such in the applicable SDS or label.
 - b. is identified as such by the Oak Ridge Toxicology Information Resource Center (TIRC).
- 3. If reproductive toxins are used,
 - a. they shall be handled only in a hood and only when satisfactory performance of the hood has been confirmed.
 - b. gloves, goggles, and protective clothing shall be worn while handling reproductive toxins.
 - c. persons using substances defined as reproductive toxins must wash hands and arms immediately after working with such materials.
 - d. these materials must be stored in a well-ventilated area and be properly labeled.
- 4. Examples of reproductive toxins used in the chemistry labs at Montgomery College are xylene, toluene, ethyl ethers, and ethidium bromide.

G. Select Carcinogens

- 1. Select carcinogen means any substance which meets one of the following criteria:
 - a. it is regulated by OSHA as a carcinogen.
 - b. it is listed under the category "known to be carcinogens" in the National Toxicology Program (NTP) Annual Reports on Carcinogens.
 - c. it is listed under Group 1 "carcinogenic to humans" by the International Agency for Research on Cancer Monograms (IARC).
 - d. it is listed in either Group 2A or 2B by IARC or under the category

"reasonably anticipated to be carcinogens" and causes statistically significant tumor incident in experimental animals under set criteria of exposure.

- 2. All work with these substances should be conducted in a designated area such as a fume hood, glove box, or a portion of the laboratory designated for use of chronically toxic substances. Such a designated area will be clearly marked with warning and restricted access signs.
- 3. Any procedure that may result in a generation of aerosols or vapors shall be performed in a hood whose performance is known to be satisfactory.
- 4. Skin contact must be avoided through the use of appropriate gloves, goggles, and protective clothing. Any protective clothing shall be removed before leaving the designated area and placed in a labeled container.
- 5. Select carcinogens shall be stored in unbreakable containers in a ventilated area with controlled access. All containers shall be labeled with the identity and hazard of the substance.
- 6. Examples of select carcinogens are benzene, vinyl chloride, and formaldehyde.