To close the yellow note, click once to select it and then click the box in the upper left corner.
To open the note, double click (Mac OS) or right click (Windows) on the note icon.

#04 Laboratory Safety Orientation

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Health & Safety Learning Tools

You have been asked to review this information as a preliminary training exercise. You will be tested on a few safety items, so feel free to take notes. The test is not difficult. When you feel comfortable with the material, tell the Stockroom Manager and you'll receive your test. When you pass it you'll be certified at an awareness level. This certification will allow you to work with some confidence in the stockroom. Things you need to review are listed below and appear on the following pages.

Safety Documents at Delta College

(Feel free to change and adapt any of this information to suit your institution.)

Emergency Plans

This document is the outline of how we respond to an emergency in the Chemistry Dept. Read the material and think of a question you can bring to the group discussion.

Spill Appendix

This document is a guideline for how and when spills can be cleaned up by authorized (trained only) personnel.

Accident Report

This is an example accident report. All accidents, cuts, and spills must be reported even if they are minor.

Lab Safety Manual

This is a copy of a Student Lab Safety Manual. As a stockroom employee you are a representative of the Chemistry Dept. Therefore, you should be familiar with lab rules which apply in the stockroom as well as the labs. If you observe a violation of the lab safety rules, report it to the stockroom manager or the instructor of the class immediately.

Bulletins

This space is used for the display of periodic employee safety bulletins.

MSDS

MSDS stands for Material Safety Data Sheets. Under the Michigan Right to Know Law you have a legal right to request information about any chemical you may be working with or are likely to come in contact with. MSDSs are the information sheets that state hazards, and warnings, and provide precautions you must take in order to safely work with a chemical.

Chemical Hygiene Plan

CHP stands for Chemical Hygiene Plan. This document is the foundation of our safety plans.

Respiratory Protection Plan

This document is our written Respiratory Protection Plan as required by MIOSHA. Only trained individuals may wear a respirator. If you feel you need a respirator see the CHO (Chemical Hygiene Officer) of your Institution.

Self-Quiz

This is the self-quiz you've been dreading, but it's really not that hard; If you've read everything, you'll have no trouble. Feel free to print the quiz page, and click back on the links above to check your answers. When you're finished return your quiz to the stockroom.

EMERGENCY PLANS FOR CHEMICAL ACCIDENTS

Occurrence:

I. **Chemical Spill of a Known Substance**. (one container)

See Spill Appendix

II. Chemical Spill of an Unknown Substance. (one container) (all containers must be labeled but errors occur.)

A qualified individual must test and identify the substance. Go Back to I. Above

III. Chemical Spill that involves a student. (Act quickly.)

Call the Nurse, _____ .

Start decontamination procedures (below). Keep others away from the spill.

IV. Chemical Spill of a major amount. (e.g., if a shelf falls)

Evacuate area; prevent reentry to the area.

Summon authorities, _____ . Cordon off the area.

V. Compressed Gas Leak. (Treat as an unknown chemical, but call for immediate C-Wing evacuation.)

VI. Fire (Strike fire alarm and evacuate the building.)

Response to Student Injury

Run, Rinse & Remove Phase: Determine if evacuation is necessary!!!

0. If a spill contacts a student, rinse the affected areas immediately. Remove any and all contaminated clothing. Give the fire blanket to the student, so they feel more comfortable (Do not worry about making a mess. You are the important one.)

0.a Call _____ to inform the Campus Police. They will inform the necessary authorities. The nurse's phone number is _____ .

0.b Send class into the hall or the cafeteria to give an affected person some sense of privacy and to reduce embarrassment.

0.c Do not move the person, wait for the school nurse, leave first aid to those who are trained. (See chemical burn chart or heat burn chart in Office _____)

Communication Alert Phase:

1a. Immediately inform the stockroom person on duty, who will in turn inform _____ by calling _____ or _____ .

1b. If you cannot reach_____ call _____ , which is the number for the Campus Police.

2a. For an unknown or major chemical spill: evacuate the room in question, lock the doors and allow no one back into the room.(No students are allowed to " just grab their car keys. ") If the spill takes place in a hood, close the hood and make sure the red light is on. If the spill takes place in a hallway, block off the hallway and evacuate the nearest classroom(s).

2b. When you have contacted someone from Security 1a or 1b, give the following information: The material involved, the type of spill: Known, Unknown, Major, if students are involved, amount of material, and if current location endangers anyone or anything. Tell them, using your best judgment, how serious the situation is. If you are talking to the Campus Police, ask them to locate any chemistry instructor. Tell them to inform the instructor about what has occurred and to consult the chemistry instructor for advice.

2c. If serious, contact all classes in C- Wing and inform them of the situation, advise them that they may be asked to evacuate C- Wing in the next few minutes and to be alert.

Evaluation/Waiting/Evacuation Phase:

3. Do not attempt to clean up any spill, unless there is no danger to you. See below #5 for clean up instructions.

4. If the situation changes while waiting for help (i.e., you see smoke, bubbling, gas cloud, strange odor, or a fire develops), then signal the start of evacuation of C-Wing. If a fire occurs, strike the Fire Alarm.

Cleanup Phase:

5. If you know that there is no danger and you are properly trained (See HAZWOPER regulations) to do so, clean up the spill. In the process of cleanup, consult the Dangerous Materials Chart at the front left of room C-106 (stockroom) for proper procedures and equipment for cleanup. Do not use any equipment you are not trained and/or fit tested to use.

   For Acid Spills: See the Spill Appendix on acids. (Do not clean unless trained to do so!)
   For Base Spills: See the Spill Appendix on bases. (Do not clean unless trained to do so!)
   For Organic Liquids: See the Spill Appendix on organics.
   (Flammables & Poisons!!!) (Do not clean unless properly trained to do so!)
   For Mercury Spills: See the Spill Appendix on mercury.
   For Thermal Spills: See the Spill Appendix on thermal spills.
   For Unknown Spills: See the Spill Appendix on unknown spills.
   For Other Reactive Spill Types: See the Spill Appendix on other types of spills. (If you are not trained or unsure of proper safety precautions, you should never attempt to clean up a spill of any kind.)
   See the Spill Appendix on spills deemed safe or housekeeping category.
   See the Spill Appendix for housekeeping or non-hazardous.

6. Once cleanup has started, that is your "Number One Priority." If someone needs something, they can wait. An emergency exists until the spill is safely cleaned up. (REFER TO THE SPILL APPENDIX.)

7. Please inform anyone you previously put on alert that the situation has been neutralized. This is so they do not worry needlessly about a nonexistent situation.

8. I expect to see a cleanup write-up after every spill. This is to explain what happened and how it happened. Just the facts. The reason for this write up is so we can work to prevent any future accidents by learning from the past.

SPILL APPENDIX

A Chemical Spill of a Known Substance. (one container)

If the substance is known, classify it and select the appropriate guideline for cleanup. Never clean up a chemical spill alone, never attempt a very large spill without help, and never touch anything you are not trained to handle. Known spills fall into several categories listed below. (* Consult manufacturers specifications on PPE selection.)

Spill Control Guide for Non-Hazmat Acid Spills
(Use of HCl not recommended at High School Level)

1. Assess the situation. If the spill is minor (500 ml or less) and poses no threat (of contamination or injury), then it may be cleaned up as a housekeeping activity.
2. Wearing an apron, gloves *, and goggles is highly recommended at all times during spill clean up.
3. Measure the pH with a piece of 1-14 hydrian paper. If the pH is 6-9, see step 7. If the pH is > 10, see step 6. Otherwise continue to step 5
4. Encircle the spill with Baking Soda or Sodium Bicarbonate obtained from the chemical stockroom. It will fizz. Add sufficient Baking Soda until the spill no longer has the potential to fizz.
5. If the pH falls in the 1-5 range, the spill is still acidic. Add more Baking Soda & mix. Go back to step 3.
6. If the pH is > 10, the spill is basic. You are using the wrong protocol. You must observe safety precautions. (Go to the Guide for Basic Spills, Step 1).
7. If the pH falls in the 6-9 range, the spill is now safe. Wearing an apron, gloves & goggles, you may cleanup the spill using soapy water, paper towels, and a bucket.
8. If at anytime you feel Unsafe, Unsure, or Uncertain, STOP what you are doing and seek assistance from your Instructor or the Chemical Stockroom. Reference Flinn Chemical Disposal Methods #24a for more complete information.

Spill Control Guide for Non-Hazmat Basic Spills

1. Assess the situation, if the spill is minor (500 ml or less) & poses no threat (of contamination or injury) then it maybe cleaned up as a housekeeping activity.
2. Wearing an apron, gloves *, & goggles is highly recommended at all times during spill cleanup.
3. Slowly add to the spill a portion of (6 M HCl, Boric acid, or Citric acid) calculated to be the amount needed to neutralize the Base. You can obtain (6 M HCl, Boric acid, or Citric acid) from the chemical stockroom. If Unsure Seek Assistance from your instructor. (In some cases absorbent spill kits will work more effectively.)
4. Measure the pH with a piece of 1-14 hydrian paper. If the pH is 6-9, see step 7. If the pH is > 10, go to step 5. Otherwise continue. (Go to step 6).
5. If the pH is > 10 range, the spill is still basic. Add more acid slowly. (Go Back to 3.)
6. If the pH is < 5 range the spill is acidic. You are using the wrong protocol or you have added a little to much acid. (Go to the Guide for Acidic Spills, Step 1).

7. If the pH falls in the 6-9 range, the spill is now safe. Wearing an apron, gloves & goggles you may cleanup the spill using soapy water, paper towels, and a bucket.
8. If at anytime you feel Unsafe, Unsure, or Uncertain, STOP what you are doing and seek assistance from your Instructor or the Chemical Stockroom. Reference Flinn Chemical Disposal Methods #10 for more complete information.

Spill Control Guide for Hazmat Mercury Spills

1. Mercury spills of any size are considered to be a Hazardous Material. No student should cleanup a mercury spill unless specifically trained to do. MIOSHA states that the min. level of training requires 4 hours of instruction. Therefore only Instructors, Trained Student Employees, and the Chemical Hygiene Officer may cleanup a mercury spill.
2. Clear all students out of the affected area. They may not return until the spill is abated.
3. Assess the situation. If the spill is minor (500 ml or less) and poses no threat (of contamination or injury), then it may be cleaned up. Spills of larger sizes will require that specialized equipment be used, the room should be cleared evacuated, sealed with full hood ventilation running, and Hazmat personnel should be summoned.
4. Wearing an apron, gloves, & goggles is highly recommended at all times during spill cleanup.
5. Encircle the spill with Zinc Dust. Using the Mercury brush sweep gently towards a center point, trapping the mercury balls in the dust. Leave excess dust in the cracks of the floor tiles to bind up trace amounts of mercury particles. Using a funnel, brush the dust & mercury mix into a clean glass jar. Seal & label the jar.
6. If at anytime you feel Unsafe, Unsure, or Uncertain, STOP what you are doing and seek assistance from your Instructor or the Chemical Stockroom. Reference Flinn Chemical Disposal Procedure 27b & Chemical Technicians Ready Reference Handbook 3rd Ed. pg 39-40 for more complete information.

Spill Control Guide for Non-Hazmat Organic Spills.

0. Advise your Instructor of the spill, and extinguish any open flames in the area immediately, until the hazard is fully assessed.
1. Assess the situation, if the spill is minor (500 ml or less) & poses no threat (of contamination or injury) then it maybe cleaned up as a housekeeping activity.
2. Wearing an apron, gloves, & goggles is highly recommended at all times during spill cleanup. If Unsure Seek Assistance from your Instructor or the Stockroom.
3. Consult your MSDS & Instructor, as to flammability, toxicity, and flash back potential of the spilled organic liquid. If and only if these factors pose no risk, should you proceed beyond this point. Otherwise contact the Stockroom.
4. Non-toxic spills, with low vapor pressures and little risk of flash back can be cleaned up. Wearing an apron, gloves & goggles you may begin cleanup of the spill using soapy water, paper towels, and a bucket. Note: The paper towels are not thrown out but are placed in a yellow tray in the hood to off-gas any organic products trapped in them. In a day or so the paper towels can be tossed out. Be sure to label the tray to protect others!

5. If at anytime you feel Unsafe, Unsure, or Uncertain, STOP what you are doing and seek assistance from your Instructor or the Chemical Stockroom. Reference Flinn Chemical Disposal Procedures 24a, 20, 18a&b; 16, 15, 14, 13, 9, 5, 4abc, 2, 1a and Chemical Technicians Ready Reference Handbook 3rd Ed. pg 38-39 for more complete information.

Spill Control Guide for Hazmat Other Reactive Spills.

1. Other Reactive spills of any size are considered to be a Hazardous Material. No student should cleanup a reactive spill unless specifically trained to do. MIOSHA states that the min. level of training, requires 4 hours of instruction. Therefore only Instructors, Trained Student Employees, and the Chemical Hygiene Officer may cleanup a Reactive spill. These spills include highly flammable, dangerously hot spills, reactive mixtures, oxidizers, old ethers, peroxides, and potential explosives.
2. Clear all students out of the affected area. They may not return until the spill is abated.
3. Assess the situation, if the spill is minor (500 ml or less) & poses no threat of contamination or injury (Note: That all Unknowns are considered to be a threat) then it maybe cleaned up. Using the protocol developed after the spill characterization is complete (See Step 5). Spills of larger size will require that specialized equipment be used, the room should be cleared evacuated, sealed with full hood ventilation running and Hazmat personnel should be summoned.
4. Wearing an apron, gloves, & goggles is highly recommended at all times during spill cleanup.
5. Consult the Flinn Catalog located in the Stockroom Office Area. Begin the Chemical Disposal Procedures listed on p. 648, note this may take several days.
6. If at anytime you feel Unsafe, Unsure, or Uncertain, STOP what you are doing and seek assistance from your Instructor or the Chemical Stockroom. Reference Flinn Chemical Disposal Procedures and Chemical Technicians Ready Reference Handbook 3rd Ed. pp. 39-40 for more complete information.

Spill Control Guide for Non-Hazmat Thermal Spills.

1. Assess the situation, if the spill is minor (500 ml or less) & poses no threat (of contamination or injury) then let it cool, until it may be cleaned up as a housekeeping activity.
2. Wearing an apron, gloves, & goggles is highly recommended at all times during spill cleanup. If unsure, seek assistance from your instructor.
3. Measure the pH with a piece of 1-14 hydrian paper. If the pH is 6-9, see step 7. If the pH is > 10, go to step 5. Otherwise continue to step 6.
5. If the pH falls in the > 10 range the spill is still basic. You must observe safety precautions. (Go to the Guide for Basic Spills, Step 1).
6. If the pH is < 5, the spill is acidic. You are using the wrong protocol. You must observe safety precautions. (Go to the Guide for Acidic Spills, Step 1).
7. If the pH falls in the 6-9 range, the spill is now safe. Wearing an apron, gloves & goggles you may cleanup the spill using soapy water, paper towels, and a bucket.
8. If at anytime you feel Unsafe, Unsure, or Uncertain, STOP what you are doing and seek assistance from your Instructor or the Chemical Stockroom.

Spill Control Guide for Hazmat Unknown Spills.

1. Unknown spills of any size are considered to be a Hazardous Material. No student should cleanup any unknown spill unless specifically trained to do. MIOSHA states that the min. level of training requires 4 hours of instruction. Therefore only Instructors, Trained Student Employees, and the Chemical Hygiene Officer may cleanup an unknown spill.
2. Clear all students out of the affected area. They may not return until the spill is abated.
3. Assess the situation. If the spill is minor (500 ml or less) & poses no threat of contamination or injury (Note: That all Unknowns are considered to be a threat) then it maybe cleaned up. Using the protocol developed after spill characterization is complete (See Step 5). Spills of larger size will require that specialized equipment be used, the room should be cleared evacuated, sealed with full hood ventilation running and Hazmat personnel should be summoned.
4. Wearing an apron, gloves, & goggles is highly recommended at all times during spill cleanup.
5. Consult the Flinn Catalog located in the Stockroom Office Area. On Page 611 begin the Unknown Solution Identification process, note this may take several days.
6. If at anytime you feel Unsafe, Unsure, or Uncertain, STOP what you are doing and seek assistance from your Instructor or the Chemical Stockroom.

Spill Control Guide For Non-Hazmat Housekeeping Spills

1. Assess the situation. If the spill is minor (500 ml or less) & poses no threat (of contamination or injury) then it maybe cleaned up as a housekeeping activity.
2. Wearing an apron, gloves, & goggles is highly recommended at all times during spill cleanup. If you are unsure, seek assistance from your instructor.
3. Measure the pH with a piece of 1-14 hydrian paper. If the pH is 6-9, go to step 7. If the pH is >10, go to step 5. Otherwise continue to step 6.
5. If the pH falls in the > 10 range, the spill is still basic. You must observe safety precautions. (Go to the Guide for Basic Spills, Step 1).
6. If the pH falls in the < 5 range, the spill is acidic. You are using the wrong protocol. You must observe safety precautions. (Go to the Guide for Acidic Spills, Step 1).
7. If the pH falls in the 6-9 range, the spill is now safe. Wearing an apron, gloves & goggles you may cleanup the spill using soapy water, paper towels, and a bucket.
8. If at anytime you feel Unsafe, Unsure, or Uncertain, STOP what you are doing and seek assistance from your Instructor or the Chemical Stockroom.

II. Chemical Spill of a known major amount. (e.g., a shelf falls, etc.)

1. Evacuate Area. Prevent Reentry to Area.
2. Summon Authorities. Cordon Off Area.
3. Do not attempt to clean up any spill, unless there is no danger to you*. See #5 for cleanup instructions.
4. If the situation changes while waiting for help, i.e. (smoke, bubbling, gas cloud, strange odor, or a fire develops) then start evacuation of C-Wing. If evacuation is called for strike the fire alarm.

*Cleanup Phase:

5. If you know that there is no danger and you are properly trained (See HAZWOPER Regulations.) to do so, cleanup the spill. In the process of cleanup, consult the Dangerous Materials Chart at the front left of room C-106 (stockroom) for proper procedures and equipment for cleanup. Do not use any equipment you are not trained and/or fit tested to use.
6. Once cleanup has started, that is your "Number One Priority. If someone needs something, they can wait. An emergency exists until the spill is safely cleaned up.

   Obtain backup - Find someone who can go for help in case something goes wrong.

   Inform your backup - Tell them what they are excepted to do.

   Post a sign - Warning others what you are doing, a good job for your back-up person is to keep others away from the affected areas.

   Gather the materials you think you will need.

   Select *PPE Personal Protective Equipment sufficient for the task.

   Consider what waste will be generated and make plans to handle it.

   BEGIN Cleanup

SAMPLE ACCIDENT REPORT

DATE OF INCIDENT : 04/01/97 TIME OF INCIDENT: 4:29 PM
LOCATION: Organic Laboratory C-114 INSTRUCTOR: Prof. Gizmo
AFFECTED INDIVIDUAL(S): Samuel Asleepy WITNESS: Susie Watchman

DESCRIPTION OF INCIDENT: Sam wasn't paying attention and spilled 500 ml of conc. nitric acid on the bench-top. In his rush to clean it up, he somehow got it on his clothes. Professor Gizmo rushed him to the shower, where the contaminated clothes were removed, and the affected areas were washed. Dave Gothelp went to the stockroom to call the nurse. The campus nurse arrived shortly to see Sam. Sam went with the nurse, and was treated then released. Meanwhile, a stockroom employee who was trained in spill cleanup arrived, neutralized the spill, and had it cleaned up before Sam came back. Sam told me his injuries were minor, 1st degree burns, and that he was supposed to check back with the nurse in a day or so.

Pay attention to details. Most accidents happen early in the morning or at the end of a day when students are rushing to complete their work. Even changes in daily light savings time have been considered significant factors in injury cases. Feel free to draw up a series of factual or fictional accident reports and have your students talk about them and draw their own conclusions about causative factors, contributing factors, and what preventative measures can be added to stop further accidents of a similar nature from occurring. This is an excellent activity to try after a near accident has occurred in the lab, while the students are still buzzing and concerned about their safety.

LABORATORY SAFETY MANUAL
Safety Program For New Chemistry Students & Returning Chemistry Students.

Introduction:

The study of chemistry is a fundamental part of any science curriculum. Since chemistry as a science has developed largely as a result of experimentation, your study of chemistry will be augmented by laboratory experiences that will be used to demonstrate, clarify and develop the principles of chemistry discussed in the classroom. Your laboratory manual, along with pre-laboratory and post-laboratory discussions by your laboratory instructor, will help in your efforts to realize these objectives. However, the laboratory experience is what you make of it; you must shoulder a significant portion of the burden.

A chemical laboratory environment differs considerably from the outside world, and it is necessary to make a few adjustments. In a sense, you will be adopting a new life style or code of behavior for your time in the laboratory. The lifestyle in the laboratory is a very structured one. Certain codes of conduct pertaining to your safety and that of others must be observed at all times: moreover, there are certain prescribed procedures for using glassware and other pieces of equipment.

Once you have read the following rules you will be asked to sign the attached form. This is to certify that you did, in fact read the rules and agree to adhere strictly to them at all times. Once you adopt the operating rules as a code to be followed at all times, you will be able to profit from and enjoy your lab experiences to a greater degree. You will be able to complete the experiments given in your lab manual in a relatively safe environment.
A proper respect for good housekeeping practices will prevent contamination of your laboratory glassware from hindering ion effects. This, and your correct use of glassware and other equipment, should ensure your success with the experiments you will execute through the course of the semester.

Safety Rules:

Work in the laboratory should be a safe experience. It will be safe; however, only if certain safety precautions are followed without exception. The safety rules that will form a large portion of your code of conduct in the laboratory are listed as follows:

1. Locate safety equipment. Find the eyewash station, emergency shower, fire extinguisher, fire blanket, emergency safety instruction notebook, and all exits that are to be used in an emergency. Locate the telephone in the stockroom, and note the posted emergency numbers in each room. Your laboratory instructor will describe, test and demonstrate the various safety equipment in your lab room.
2. Protect your eyes. Wear splash-resistant goggles at all times. They are the official eye wear for all chemistry labs at Delta College. Safety glasses with side shields are not an acceptable substitute. Prescription eyeglasses should be worn under the goggles if they are normally needed. Contact lens are discouraged, because of their tendency to harbor various fumes, and increase the likelihood of eye injury. Goggles are available for purchase from the bookstore.

If any chemical comes in contact with your eye, the most effective first aid is the immediate flushing of the eye with copious amounts of water. Often, this will save the eye from additional injury and pain. There is an eyewash station in each lab room. Call for help if you have trouble with its operation. Continue flushing the eye for fifteen minutes (30 minutes for bases) or until trained medical help arrives and directs you to do otherwise. Inform the instructor and send someone for help.

3. Long hair in a lab is a hazard. Tie it back and keep it out of harm's way. This will prevent your hair from finding a Bunsen burner, or dipping in to a harmful chemical.
4. You must find the 'Emergency Plans for Chemicals Accidents'. It is located in a black notebook in the front of each lab room. This is to make sure that you know where to look for advice in an emergency situation should you not remember what to do.
5. Broken glassware is the most common accident we see. To avoid cuts from shattering glass, wear shoes that cover your feet completely all the time. Sandals, open toed shoes, or just worn out tennis shoes with a toe exposed are not adequate protection.
6. There is nothing wrong with not knowing how to do something. There is something very wrong with trying to do something you know nothing about. PLEASE, if you have any questions or aren't sure about something, ask the lab manager.
7. Wear only clothes that cover your torso and legs. Clothing will often give a few extra seconds of protection that make the difference between a hole in the jeans and a nasty burn on your leg. Midriff T's, ripped up jeans, and mini's, although fashionable, are not acceptable. If you forget and wear good clothes, a limited number of lab aprons are available from the stockroom.
8. Do not eat, drink, chew gum, or put anything into your mouth while in the laboratory. Over 2,000 chemicals have been used in these lab rooms, and traces of them are on every table. Although invisible, these chemicals can still be potent. So to avoid inadvertently ingesting a harmful chemical, don't even put your pen in your mouth to hold it.
9. Do Not Hurry! There is plenty of time to complete each lab exercise. If you need to leave early, a make-up lab can be scheduled. Adequate pre-laboratory preparation is essential, it can cut wasted steps and speed the final outcome. Read and outline your experimental procedure before starting each lab. This is guaranteed to get you finished in plenty of time.
10. Do not taste any chemical. Even those that might have pleasing odors often times have harmful effects if ingested.
11. Never smell a chemical directly. Use your hand to waft the odor to your nose. This dilutes the odor and can prevent accidental burning of the nasal passages, and prevent mucus membranes from some of the more potent vapors like ammonia.
12. Any and every cut, bruise, burn, scratch, and injury that occurs in the laboratory must be reported. Even if you feel it is minor, it still should be reported to your instructor or the lab manager, who will determine if it should be reported to Health Services. Remember, an acid burn that goes untreated can become seven times worse than a fire burn of the same size, and a base burns seven times worse than that of an acid burn if left untreated. Chemical burns if left untreated continue to burn silently, hours after contact occurs, often deadening the nerves. If your hands feel sunburned or very slippery, you may be at the start of an invisible chemical burn. Always wash your hands thoroughly after lab.
13. Never pipette a solution by mouth. Always use a squeeze bulb.

14. Never open flammable liquids near an open flame. Pressurized vapors often escape, creating the potential for a flash fire. Keep all flammable liquids away from open flames.
15. Use extreme caution when heating any liquid in a closed or constricted container. For example, when heating a liquid in a test tube, always apply heat at the interface of the solution and the air. Heating below this point can cause bumping which is the rapid evaporation and evolution of steam below a liquid layer, which causes hot dangerous fluids to be ejected from the test tube. Also, be aware of where your tube is pointed, so if bumping does occur the projectile does not hit your face or your neighbor's face.
16. Never store any chemicals, unknowns, or samples in your laboratory drawer.
17. Never remove a chemical from the laboratory for any reason. This is grounds for expulsion and other severe disciplinary action.
18. Horseplay or any incident involving water bottles, will result in expulsion from lab for the day (no make-up or credit); a second incident will result in ejection from class.
19. If you are called upon to dilute or use concentrated reagent, please remember to add the reagent to water. NEVER ADD WATER TO A CONCENTRATED REAGENT !!! A reaction, and possible spraying of the concentrated reagent may occur. Ask if advice/help is needed.
20. Do not deviate from the planned experiment. Mixing uncalled for chemicals is costly, and dangerous. When discovered it will result in ejection from the class.
21. Never work in the lab alone. You must have the authorization of your instructor or the lab manager to start a lab. If you are working on a make-up, it is your responsibility to bring another person along, just in case an emergency should occur. Independent experimentation is not allowed, without a complete plan in writing approved by the CHO.
22. Always handle glass tubing with care. Many times it has burrs and hairline cracks that can break if they are over-stressed. When heating and bending glass tubing, always treat each piece as hot, because it looks cool long before it's safe to handle. When inserting glass tubing, always use a lubricant like glycerin, and never force a piece of glass. It might break before insertion occurs.
23. Always hold containers below face level while stirring and observing it's contents.
24. Be aware and wary of your neighbors actions. Are they following the safety rules? A neighbor's goofing-off may cause you injury, if you're not watching out for them.
25. Use a hood when required by the lab manual or directed by your instructor. Safe hood operation requires that the opening be at the yellow and black tape marks or lower. If the hood door is open higher than that point, chemicals can actually be drawn out and into your face. Check the hood opening level each time you use a hood. Hoods with built in flow meters should be checked each time, to see if they are working.
26. Maintain aisles free from obstruction. Close lab drawers when not in use. Push chairs in toward the counter, and keep all unnecessary books, bags, and coats in the front of the room.
27. Wash your hands carefully after each lab, and whenever you come in contact with any substance. Hands contaminated with potentially harmful chemicals may harm your face, eyes, mouth, and mucus membranes without even being felt on your hands.

Housekeeping Rules:

All of you realize that good housekeeping in your home provides a pleasant place in which to live. Good housekeeping in the laboratory will also lead to pleasant surroundings. In addition, it will provide a safe work site in which you may be assured that chemicals are not contaminated. Please obey the following rules:

1. Clean up broken glass immediately. All glass and other sharp objects should be placed in the waste glass box located in each lab. NEVER throw glass in the waste basket ! Gloves, broom and dust pan are located in each room and in the stockroom.
2. Notify your instructor or lab manager of any chemical spill immediately! Do not attempt to clean it up yourself until it has been neutralized by trained personnel.
3. Never pour any chemical down the drain! Recovery containers are usually located in each hood. If none are available or are full, ask for one in the stockroom.
4. Don't insert a pipette, or dropper into a common stock bottle. This may contaminate the bottle. Instead, pour the amount needed into a beaker and then pipette or dropper from there.
5. Always read a bottle's label Twice, to avoid a mix-up. The wrong chemical can lead to accidents or unexplainable results. Pay special attention to the differences in naming like 'ate', 'ite', 'ide', and 'anhydrous' versus 'hydrated' chemicals. Pay special attention to the concentration listed on the bottle. (2 N 'normal' is not always equal to 2 M 'molar'.)
6. Often times reagent bottle tops become stuck. It may become necessary to clean the outside of the bottle of accumulated crystals or other contaminants. Rinse the neck of the bottle and stopper with distilled water and wipe dry. If the stopper still refuses to budge, gentle tapping of the stopper while rotating the bottle a quarter turn may help loosen a frozen top.
7. Use special care when handling bottle stoppers. Treat them as if they were contaminated, being careful not to set them down, or they will pick up contaminants from the counter.
8. Take only the portion of chemical you need. You can always return for more. Never return the unused portion as it may be contaminated. Usually 1-3 ml for test tubes is sufficient.
9. Never bring back a chemical to a stock bottle. Any unused portion is assumed to be contaminated, and must be disposed of in an appropriate waste jar.
10. Clean all glassware used each week with the detergent/soap you bring from home. Rinse first with warm tap water, then wash once or twice with small amounts of distilled water. Dry each piece using the lint free cloth you brought from home or let air dry. Distilled water should only be used for rinsing.
11. Never dry glassware using an open flame, as this may cause spontaneous heat expansion cracking.
12. At the end of each lab period, be sure to put all unknown samples back where they came from, return all checked out items to the stockroom attendant, ask for your loan slip, put all of your glassware back in your drawer and lock it securely. Remember, you are responsible for all the glassware in your drawer.

Basic Stockroom Procedures:

1. Check-in Procedures: On your first day in Lab you will be assigned a lab drawer. In order to prevent it from being assigned to someone else you must sign the Drawer Master list. This book lists drawers by room and drawer number. Once signed in, you will obtain a check-in sheet. The check-in sheet allows you to take inventory of all items in your drawer. If something is missing, it must be replaced on the first day of lab, otherwise it will be assumed that the missing item was lost or broken by you! Please make sure all items are present. Once you are positive all items are accounted for, you must sign the check off sheet, record your locker combination, and return the sheet to your instructor.
2. Write down your locker combination in several secure places.
3. Lock your drawer securely each time. If your drawer is found unlocked, a yellow lock will be placed on your drawer to prevent theft.
4. Loan slips are required for every item checked out from the stock room, except for rubber stoppers. To use a loan slip, you fill out what you need, your name, student number, and your instructor's initials. You present this slip to the stockroom attendant, who will obtain the needed items. You are then to file your slip under your last name in the little metal box.
5. Returning items requires the item to be brought back to the stockroom. You must make the stockroom attendant aware that you are returning the item. The attendant will then give you back your loan slip. If you fail to retrieve your loan slip, you will be charged for the missing items.
6. Make-up Labs must be scheduled at least 24 hours. in advance and within two weeks of the scheduled lab. If you know are going to miss a lab tell us, that way we can save lab materials already prepared for you. Make-up labs are scheduled on Wednesdays, between 1-4 p.m., Lab make-ups outside this time require special arrangements. You cannot make-up a lab alone. You need to bring a friend or classmate with you for safety reasons. Before making arrangements to make-up a lab, you must obtain a make-up lab slip, and have it signed by your instructor. You can make up to one lab experiment per semester, depending on instructor.
7. Please bring the following items from home, as they cannot be provided in a cost efficient manner by us:

A. Matches.

B. A clean lint free towel or paper towels.

C. A liquid soap for dishes.

8. Dropping The Course: Students who drop a chemistry course before the first lab have no need to worry about checking out of their lab drawer. If, however, you drop after signing up for a lab drawer, you must check out!
9. Check-out: At the end of each term, the students will remove all equipment from their lab drawer. The drawer will be shaken over a waste basket, washed and dried. All equipment checked out will be returned to the stockroom. Then all equipment will be inspected for damaged or missing items. The items in question will be replaced, the equipment returned to the cleaned drawer, and a new lock will be placed upon the closed drawer. The student's name will then be crossed off of the master drawer list in the stockroom and the check-in sheet will be destroyed.

Student Avowal:
I do hereby attest to the fact that I have read and understand the preceding material contained within the body of The Delta College Laboratory Safety Manual on this the _____ Day of _____, 199__.

Signed, Current Chemistry Course **Instructor Initials**

_____ _____ _____

SAFETY BULLETINS—FAQ

(Examples of ours insert yours here.)

The following information represents many frequently asked questions by student employees, and subsets of information that are interesting or important safety concerns for employees.

To: Stockroom Employees
From: Michael T Garlick (Chemistry stockroom 9272)
Subject: Eyewash, Showers, and Fire Extinguishers

Eyewash stations are located in every classroom to use an eyewash station, turn the water on by pulling the handle and lowering face so the water sweeps your eyes. Do this for fifteen minutes to ensure all chemicals splashed in your eyes are removed.

Showers are located right next to each eyewash station in every classroom. To activate a shower, pull the handle over your head down. If you are covered with a chemical spill, remove the contaminated clothing and grab the fire blanket to warm up after washing all the chemical from yourself.

There are two fire extinguishers in every room. To properly use a fire extinguisher, pull the safety ring, while 8 ft back, point the nose cone at the base of the fire, and sweep the dry powder or CO_2 gas back and forth across the fire.

It goes without saying, but I will say it again. Alert someone else to get help!!! Tell them to use the phone and call 9111 (Campus Police).

Now, go to a classroom and check out the location of this equipment. Try it out; test an eyewash. Using a bucket, test a shower. Sign your employee training sheet for eye-washes & showers. If you have any questions, please ask, to clear up any doubt.

To: BRAND NEW Stockroom Employees
From: Michael T Garlick(Chemistry stockroom 9272)
Subject: Pregnancy Risks & Lab Work.

The following is some information I found on the Web about pregnancy risks & lab work. If you are planning on becoming pregnant or are already so please take the time to read this section very carefully.

Additionally Mike can be dense at times, so if you are pregnant inform him so he can steer you away from daily hazards that you might not wish to be exposed too. Prenatal babies are very sensitive to chemicals, so greater than normal care must be taken.

< Data gathered from link below >

Safety in the Workplace and at Home—Pregnancy and Work

Angelica M. Vecchio-Sadus http://www.dmp.csiro.au/winc/preg.htm
Site Safety Officer - CSIRO Australia
Safety in the Workplace and at Home—Pregnancy and Work
An employer has a moral and legal obligation to provide employees with a safe and healthy working environment. In some respects, the needs of pregnant employees are different from the general workplace. It is important that managers respond to these needs by carefully considering the type of work performed both during and after pregnancy [1]. This response will depend not only on the type of work and its hazards, but also on the stage of pregnancy and whether any medical complications are present. Depending on individual circumstances, this may involve:

i) a change in the nature of the duties, e.g., reduction in heavy or standing work and an increase in light or seated duties, removal from chemical risk jobs,
ii) a change in working hours which may involve only the use of flexible working hour arrangements or the actual reduction of working hours,
iii) encouragement of rest breaks and provision of facilities such as a couch (for example, in a rest room).

Although management has no legal right to know whether or not an employee is pregnant, female employees should be encouraged to report their pregnancy to their immediate supervisor as early as possible so that relevant issues can be addressed promptly and problems averted or minimized.

Physical Effects of Pregnancy on Work Performance

Nausea and sometimes vomiting may lead to a deterioration in work performance during the first trimester (first 12 weeks following conception). Fatigue is also a common problem during the early and late stages of pregnancy. This may in turn exacerbate any other stresses present such as difficulties in commuting to and from work, and the negative attitudes of management and/or fellow employees.
In the second trimester (13 to 28 weeks after conception), many pregnant women experience musculoskeletal problems because of the outward bodily expansion. The onset and aggravation of lower back pain and stiffness are commonly attributed to changes in activity patterns or work postures [2]. In addition, physical changes such as weight gain increase the strain in a given posture. Towards the end of this trimester, more physical difficulties may be experienced, e.g., reduction in effective arm reach, a chair cannot be pulled in as close to a desk as usual. Balance becomes less stable and falls are more common (as well as more hazardous) caused by a change in the body's center of mass. Dizziness and fainting may also occur, particularly in a hot environment or with prolonged standing.
In the third trimester (after 29 weeks from conception), the problems of the second trimester continue. Fatigue is more pronounced and is often worsened by insomnia. There may also be a variety of aches and pains due to stretching of abdominal and pelvic muscles and ligaments. Constipation, hemorrhoids, varicose veins and bladder problems may also cause discomfort. Each of these alone may not present a significant problem, but when a number are present, it is likely that they will affect the woman's work capacity. Generally, it is not feasible for a pregnant woman to continue work beyond 34 weeks after conception (i.e., 6 weeks before the expected date of the birth). They should only be permitted to continue working if they provide medical certification of fitness to continue work including a description of the duties which they are fit to carry out safely.

Effect of Chemicals and Radiation on Pregnancy

The main area of concern in occupational reproductive toxicology is the workplace exposure to the mother during pregnancy and the likelihood of fetal abnormalities resulting from such exposures. Environmental pollutants are certainly responsible for some congenital defects (methyl mercury at Minimata Bay, Japan). Other than radiation, the only occupational exposure known to carry a risk to the fetus is lead [3] which is known to cause spontaneous abortion and stillbirth. There is also some evidence that exposure to very high levels of lead during pregnancy may, if the foots survives, cause damage to the central nervous system.
Toxic agents may also be transferred via breast milk. Some problems may be encountered when combining breast feeding with work. The most common are fatigue and difficulty in establishing and maintaining lactation. In certain circumstances, it is known that workplace contaminants may be concentrated and excreted in breast milk. These contaminants are most likely to be fat soluble. The best known are some of the organic pesticides (e.g., DDT). Other agents that may induce adverse reproductive outcomes from occupational exposure during pregnancy are given in Table 1 [4].

Table 1. Occupational exposure to agents that may cause adverse reproductive outcomes.

alkylating agents	**drug workers**
arsenic	**agricultural workers**
benzene	**chemical workers**
chlorinated hydrocarbons	**laboratory and craft workers, dry cleaners**
diethylstilbestrol	**drug workers**

dimethyl sulphoxide——————laboratory workers
dioxin——————————————agricultural workers
ionizing radiation——————x-ray technicians, nuclear specialists
polychlorinated biphenyls————electrical workers, microscopists

A population-based medical birth registry linked to the US census for 1976, 1981 and 1986, investigated the delivery outcome of women who worked in the chemical industry or whose cohabiting partners had such work [5]. Infants born of women working in such industry showed a high rate of low birth weight and short gestational length and also of infant death. The latter phenomenon was only seen among infants born in 1976. A pregnancy and lifestyle study investigated the association between occupational and environmental exposure to chemicals and reproductive outcome, live birth, miscarriage or infertility [6]. Female factors associated with infertility were age and home renovating if aged 35 or older.

First trimester spontaneous miscarriage was associated with age, visiting factories in the course of work, X-rays of the abdomen, home use of glues and working at home if aged less than 35. The most significant findings of the study were the poor outcomes associated with abdominal/back X-rays and home exposure to chemicals.

A Scandinavian study examined the relation between employment status during pregnancy and the potential risk of having a premature delivery and a small-for-gestational-age infant [7]. The respondents were divided into five groups: women working throughout pregnancy; women working in the first, but unemployed during the second trimester; women on sick leave in the first and second trimester; women unemployed throughout pregnancy; and students. Studies found that in partially unemployed women had a lower risk of premature delivery, and that women on sick leave had a higher risk of premature delivery compared with working women. Overall, there was little evidence that work had any detrimental or beneficial effects on the risk of having a small-for-gestation-age infant or a premature delivery.

Maternal exposure to ionizing radiation increases the risk of leukemia in the child. The production of estrogen in high dose increases the risk of vaginal cancer in the offspring. Many epidemiological studies have investigated the claim that work with video display units (VDU) is a risk factor during pregnancy [8]. Results have been inconsistent, and in the majority of cases, the hypothesis was not supported. Overall, the studies indicate that VDU operators are not at greater risk than the general population, because very low frequency (VLF) magnetic fields do not appear to be a risk factor and extremely low frequency (ELF) magnetic field exposure is not significantly greater than that experienced in other occupational and residential environments.

In recent years, studies have been conducted on the biological effects and possible health outcomes of weak electric and magnetic fields [9]. Studies have been presented on magnetic fields and cancer, reproduction, and neurobehavioural reactions. Epidemiological studies on childhood leukemia and residential exposure from power lines seem to indicate a slight increase in risk, and excess leukemia and brain tumor risks have been reported in ‘electrical occupations. In spite of a large number of experimental laboratory studies, however, no plausible and understandable mechanism has been presented by which a carcinogenic effect could be explained. Studies on reproduction, including adverse pregnancy outcomes and neurobehavioral disorders, are generally considered insufficiently clear and inconsistent.

What action should we take?
Little is known about the effects of the physical and chemical occupational environment on reproduction [10]. With a few exceptions, current occupational exposure standards are not designed to protect men and women from reproductive toxic effects. As reproductive toxic effects have rarely been observed with what are otherwise non-toxic exposures to physical and chemical agents [11] it seems likely that the application of current threshold limit values (TLV) provides a baseline for reducing exposure to physical and chemical substances which affect reproduction.

The control of reproductive hazards in the workplace should not be seen as a separate issue to that of

the general control of occupational risk. Action to remove females (whether pregnant or not) from work which may result in exposure to an agent with adverse reproductive effects is only appropriate when other methods of risk control are not feasible, and even then this removal should be seen only as an interim measure. The concern with reproductive hazards should be an integral part of the occupational health and safety practices of an employer, and information on the effects of exposure should be gathered through material safety data sheets (MSDS). Psychological and biological hazards which may be present in the workplace should be assessed and efforts made to minimize the associated risks.

References

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5. B. Kallen and O. Landgren, Journal of Occupational Medicine, 36 (1994) 563.
6. F.H. Ford , L. MacCormac and J. Hiller, Mutation Research: Environmental Mutagenesis & Related Subjects, 313 (1994) 153.
7. T.B. Henriksen, D.A. Savitz, M. Hedegaard and N.J. Secher, British Journal of Obstetrics & Gynaecology, 101 (1994) 858.
8. V. Delpizzo, American Journal of Industrial Medicine, 26 (1994) 465.
9. B. Knave, Scandinavian Journal of Work, Environment & Health, 20 (1994) 78.
10. R. Smith, Chemical Risks and the Unborn: A Parents Guide, Health and Fitness Total Environment Centre.
11. S.M. Barlow and F.M. Sullivan, Reproductive Hazards and Industrial Chemicals, Annals of Occupational Hygiene, 24 (1981) 359.

READING AN MSDS OR MATERIAL SAFETY DATA SHEET.

This topic is very important, so important in fact that we do not leave it to a simple review process. Please Call 9209 and speak to Linda Petee or visit her office at A-199. Linda is Delta College's MSDS Training Coordinator, and she will sign you up for a MSDS training session scheduled several times throughout the semester.

In the meantime, contact Michael Garlick ext:9272 he is Delta College's Chemical Hygiene Officer. He can provide you with an overview of the purpose, content, and reasons behind the MSDS.

There are many good pamphlets on how to read an MSDS Sheet which are full color and very nice. Check em Out!

Hazard Communication Program by Krames Com. 312 90th St. Daly City, Ca.94015-1898 (415)994 8800

You, Delta College & Safety contact Linda Petee A199 Delta College University Center, MI 48710 (517) 686-9209

These are examples of ones I use

THE CHEMICAL HYGIENE PLAN

PART I

A provision for the assignment, of a Chemical Hygiene Officer.

On 1/14/91, I contacted Larry Ramseyer via memo about this situation. It is then the responsibility of Delta College to officially appoint a person to this position. On July 7th 1993, said appointment was confirmed by Chuck Creed with Michael Garlick via memo, and as such he will assume the position of Chemical Hygiene Officer (CHO) here at Delta College for the 96-97 School year. This posting is on a yearly basis, and no expectation of a continuing contract basis was expected nor offered.

PART II

Subpart A. & Subpart B.

Standard Operating Procedures for Hazardous Chemicals. Criteria Used To Determine Adequate Protection From Chemicals.

1. Goggles shall be used, whenever chemicals are out and open.
2. Aprons & gloves * will be worn when a spill or splash hazard exists.
3. Chemicals that produce vapors, fumes, or off gases must be handled in the hood to minimize exposure to these gaseous byproducts. If engineering controls are not sufficient then a half-face respirator* will be used. **(*See Respiratory Protection Plan.)**
4. Gloves * must be used when handling corrosives, poisons, and acids.
5. A face shield must be worn when Concentrated Acids and Bases are diluted & when working around hot, boiling mixtures.

6a. Respirators must be worn, when cleaning up a spill, or entering an area of high vapor/fume concentration (monitoring must occur if PEL is approached or exceeded). Care must be taken to ensure that proper canisters* for various fumes are used. **(See Respiratory Protection Plan.)**

6b. The **Respiratory Protection Plan** must be carefully followed by anyone who plans on using a respirator for provision 6a. above.

7. Only those trained in the proper use, of the above **PPE (Personal Protective Equipment)** are authorized to use said equipment.
8. Emergency Response procedures are detailed in the safety training program, **Emergency Plans For Chemical Accidents.** These rules are taught to all employees, and posted in each classroom.
9. All accidents even minor ones are recorded & reported to the nurse for further evaluation. Serious accidents must be reported in writing to M. Garlick (CHO), who will relay the information to the proper authorities.
10. Household refrigerators are not used for storing chemicals that require refrigeration. a proper explosion proof refrigerator must be used.
11. Laboratory glassware is never used for drinking.
12. Bottles that are reused, must be relabeled, and the old label removed.
13. The contents of unlabeled bottles, are always treated as a unknown hazardous waste and are tested before being discarded.

14. Chemicals are never to be removed from the laboratory or Delta College site without specific instructions from the instructor, or the CHO.
15. All personnel and students are instructed not to carry out any experiments without express prior approval. New experiments require a written plan review, which is to be turned in to the CHO, before approval.
16. All gas cylinders are to be chained, when is use and capped when being moved or unchained.
17. All gas cylinders are to placed where they are kept out of direct heat or flames.
18. All containers of mercury are kept sealed, except when is use. All mercury clean up must follow a set of standards listed in the **Lab. Safety Manual.**
19. First aid supplies are readily available, and have been approved by a consulting physician. All injuries are to be referred to the campus nurse.
20. All First aid supplies are clearly labeled.
21. Proper type, and numbers of fire extinguishers are kept in each and every lab room.(inspected yearly) The CHO will audit and see to it , that inspections are occurring. (inspections are contracted out by Gen Services.)
22. Flames, and sparks are kept away from flammable liquids and vapors.
23. Eye wash stations, are accessible and tested regularly.
24. Face shields are required if a danger of splashing or flying particles exists.
25. A safety shower is available within easy access to all personnel and it is tested on a regular basis.

    The CHO will verify all inspections.
26. Chemicals are stored according to similar functional groups to reduce the chance of a chemical reaction should one or more bottles on a shelf spill.
27. Special storage cabinets are used for large volumes of flammable liquids.
28. Proper closed top footwear is required of all employees.
29. A regular rotating schedule for Lab housekeeping is maintained.
30. All acid bottles are sealed, and closed when not in use.
31. All Chemicals are dated upon receipt, especially manufacturer dated peroxide forming chemicals.
32. Acid or basic corrosive materials are never poured down the drain.
33. Heavy metal waste is collected and disposed of properly and never poured down the drain, under any circumstances.
34. Volatile and flammable liquids are never poured down the drain as explosive atmosphere in the sewers can result.
35. All Chemical preparations must be approved before mixing. **(See The Chemists Cookbook)** This book lists safe effective preparation methods approved by the CHO for use by student employees.
36. Only diluted nonhazardous wastes are poured down a lead lined acid sewer, with lots of water. pH range of 6.5 to 9 is acceptable.

37. Eating, drinking, applying make-up, and chewing gum are all banned in any Lab area.

38. Contacts are discouraged, those who use them are informed of the dangers involved. Those with contacts must label their goggles so they can be kept from dangerous situations, which might affect their contacts. (acid gases, & high vapor conc.)

    * Consult manufacturers specifications with regard to matching PPE (gloves, goggles, aprons, respirators, etc.) , and hazard they are selected and approved for use with, improper selection of safety equipment imparts a false sense of security that is often more dangerous than wearing no safety equipment what so ever.

Subpart C.

Measures Used To Ensure Proper Function Of Laboratory Fume Hoods

1. All hoods will be tested on a semester basis.
2. The same vaneometer will be used to test all hoods.
3. All hoods will be tested in a like manner detailed below. (Delta specifications consult your regulations)

a. Each hood will be opened 30 cm. (to simulate normal use)

b. The vaneometer will be placed in the center of the hood.

c. Three readings will be taken, with the average of the three being entered a permanent record book.

d. A hood that shows a hood velocity slower than 100ft^3/min. face velocity should be closed & repaired.

(See The Ventilation Databook or Record of all hood testing to note hoods behavior over time.)

Subpart D.

Provisions For Employee Information & Training.

1. Each employee is made aware of **The Community Right to Know Laws.**
2. Each employee is told where to find **Material Safety Data Sheets (MSDS)** and shown how to use them.
3. MSDS Sheets can be found, in A 199. For a complete listing.
4. MSDS Sheets can also be found in C-106 The Orange File cabinet top drawer. Also a computer generated list of Organic Chemicals was purchased from Aldrich the supplier of 90% of our Organic Chemicals.
5. Each employee under goes, a safety training program called **Hazards in The Laboratory A Safety Training Program.** and they sign **The Awareness Training Check Off Sheet** as they complete each step of the safety training program.
6. Each employee is required to attend safety meetings and read bulletins posted outside the stockroom office.

Subpart E.

Circumstances Under Which Prior Approval From The Chemical Hygiene Officer Is Required, Before Implementation Can Occur.

1. Implementation of a new laboratory exercise, experiment or significant deviation from an existing experiment to cause concern.
2. Planned or unplanned independent experimentation.
3. Student Organic Synthesis reactions.**(See Independent Project Form , design your own)**
4. Employee use of a concentrated Acid or Base.
5. Students wanting to do a make-up lab.**(See Makeup Permission slip, design your own)**
6. Using any chemical that is a known Carcinogen, Mutagen, or Teratogen causing chemical for any reason.
7. Start-up of any experiment involving a compressed gas, or a chemical in amounts more than 500 grams of reactants or products.
8. Working alone on an experiment or working without instructor supervision.

Subpart F.

Procedures To be Followed For Medical Attention.

1. All injuries shall be immediately reported to the Instructor, who will in turn report to the Chemical Hygiene Officer.
2. Those injuries determined to have occurred in the Laboratory will be immediately reported to Health Services (9333), and the injured party will be escorted to Health Services for proper response and medical attention.
3. All medical examinations as needed for monitoring, exposure levels, or in response to signs and symptoms associated with possible exposure, will be coordinated through the Director of Health Services at (9333).
4. An accident/injury report, will be completed by the Director of Health Services, if it is determined to be necessary, based upon the nature and circumstances of any injury or possible chemical exposure. **(See Example Accident Report Form)**

RESPIRATOR PROTECTION PLAN

The following document is the recommended Respiratory Protection Program for Delta Collage's Chemistry Department, as outlined by OSHA 1910.134 (b).

Determination of Need and Selection of Equipment

The Chemical Hygiene Officer will perform and/ or coordinate work place hazard evaluations on a annual or as needed basis to determine where respiratory protection may be required (where personal exposures, measured by proper industrial hygiene practices are in excess of the OSHA PEL or ACGIH TLV, applicable personal exposure standard, whichever is more stringent). Respiratory protection requirements will also be determined as part of the chemical approval procedures. (See Chemical Hygiene Plan) As part of the selection and approval process the video's Safety 001 Respirator fit tests & Safety 002 Fit test procedures should be watched, in addition manufacturers' representatives, and recommendations should be consulted to determine specific respiratory protection needs.

In work areas that require routine use of reusable respirators, workers all be assigned respirators for their exclusive use, unless specifically noted and sterilized between uses. Only NIOSHA/ MSHA approved respirators and cartridges will be used. Respirators may be assigned as a temporary measure, while more in-depth work area studies are performed to determine effective control measures, such as engineering controls or substitution of less hazardous materials.

As of Jan 1st 1997, it has been determined, as described above that the following work areas/ job titles must use the listed respiratory protection for the protection against the described chemical hazard:

WORK AREA/JOB TITLE	REQUIRED RESPIRATOR	CHEMICAL HAZARD
C-106/Lab Mgr.	Wilson Ar700 w/yellow cartridge	Transfer of acid 20L or greater
C-106/Lab Mgr.	Wilson Ar700 w/purple cartridge	Barium Hydroxide mixing
C-106/Lab Mgr.	Wilson Ar700 w/green cartridge	Transfer of NH_4OH 4L or greater
C-106/Lab Mgr.	Wilson Ar700 w/needed cartridge	Waste handling transfer
C-wing/Lab Mgr.	Wilson Ar700 w/needed cartridge	Spill Control any size

Storage

New Respirators will be stored in their original cartons in a clean dry place before being issued by the Chemical Hygiene officer. Cleaned respirators will be placed in a dust tight container and stored away from sunlight, heat, extreme cold, and excessive moisture. The storage locations are C-106 in the Lab Mgr.'s office. Emergency and rescue respirators are located in the Campus Police Offices.

Note: Emergency gear-up materials are also stored away from the chemical storage area, in case an emergency occurs
in the stockroom.

Individual Evaluation
(highly recommended, often required consult the reg's of exposure.)

The Chemical Hygiene officer will determine the workers suitability to use a respirator based upon the following:

The Campus Nurse or MidMichigan MED CENTER will provide a written determination of the worker's capability, both physically and psychologically to perform the work using the designated respiratory equipment. The worker will be reevaluated periodically and/or if the respirator requirements change. This determination will follow the guidelines set forth by the Campus nurse. Where there are no local medical services, an approved outside medical consultant like MidMichigan Med in Center in Midland may be used.

The worker will receive training in the use and limitations of respirators prior to actual use. This training will be done on an annual basis. Refresher is the video Safe 001, & 002. (available through the CHO)

Effectiveness of the Respiratory Protection Program

The Chemical Hygiene Officer will evaluate the Respiratory Protection Program annually to determine if the workers are provided with the proper respiratory equipment and to ensure that the program is functioning properly.

Periodic (Annually min.) Industrial Hygiene Monitoring of the work area where respiratory protection is required will be arranged for by the Chemical Hygiene Officer to ensure that the proper respiratory equipment is being assigned and/or better controls may be implemented. The actual frequency of the industrial hygiene monitoring is determined by the particular chemical hazard and is listed below.

Chemical Hazard	Frequency of Industrial Hygiene Monitoring
Chemical Spill >100 ml	Monitoring as a clean-up progresses.
Dispensing a Large Quantity	Once per year of Acid or Ammonia.

Training

The Chemical Hygiene Officer will provide the required training in the use of Respiratory equipment. The Manufacturers' representatives may be consulted and/ or appropriate films/ or video's utilized to accomplish this training. Training will be conducted on an annual basis and will include the following.

1. How to test for proper fit and seal each time the mask is worn.
2. How to clean & maintain a respiratory unit.
3. Why beards and unshaven face cause sealing problems.
4. Selection of the proper cartridge, for a given hazard.
5. Who to report any difficulties or questions to [Chemical Hygiene Officer].

Inspection and Maintenance

The Chemical Hygiene Officer will inspect respirators in use in this facility on a monthly or as used Basis, as well as on a random basis (See inspection checklist) As part of these inspections the, Chemical Hygiene Officer will provide supervision to ensure that the proper respirator is being used correctly by the designated workers and determine if reevaluation of the work area is required.

The Chemical Hygiene Officer Will order and maintain replacement parts for respirators in use. Assigned respirator users, particularly those using air-purifying respirators, will perform daily inspections of their respirators as described in their training. When it is necessary to repair or

replace deteriorated parts, only those parts made by the manufacturer of the particular respirator will be used. A new respirator will be issued if necessary repairs cannot be made on the respirator. Respirator design defects will be reported to NIOSHA and the respirator manufacturer.
The Chemical Hygiene Officer will inspect all respiratory protective equipment designated for emergency purposes on a monthly basis and after each use to ensure that it will be in good condition and immediately available if an emergency should occur (See inspection checklist) Emergency equipment will be appropriately tagged with inspection information.

Respirators that are not used on a continuous basis by a specific worker, such as with non-routine, emergency, or rescue situations will be cleaned and disinfected after each use by the Last authorized user. All respirator users will be instructed in the proper cleaning procedures as part of their respirator training.

Record Keeping

The following information should be kept in the office of the Chemical Hygiene Officer:

1. Threshold Limit Values for Chemical substances and Physical agents.
2. Title/Name of all employees who are trained in routine use of respirators.
   a. Lab Mgr.- Michael T. Garlick
3. Title/Name of all employees who are trained in emergency use of respirators.
   a. Lab Mgr.- Michael T. Garlick
   b. Professors-None
   c. Employee(s)-None
4. Inventory of all respirator protection equipment [3 sets]
   a. Wilson Ar700 half face C-106
   b. Wilson Ar700 half face C-106
   c. Wilson Ar700 half face campus police
5. List of assigned respirators.
   a. Wilson Ar700 half face C-106 to Michael Garlick Lab Mgr.
   b. All other Respirators are for emergency use only.
6. Inspection record.
   a. Wilson Ar700 1-3-92 new assigned M. Garlick, 3-95 inspected and cleaned after each use.
   b Ar700 Wilson half face 1-95 new and unused.
   c. Ar700 Wilson half face 1-95 new and unused.

   CHO'S Notes: Fit testing completed last at 11-8-96 Mid MI Med Center. Respirator retraining via telecourse 08/04/97. 4 hour asbestos & 2 hour safety refresher Dow 05/23/97

SELF QUIZ
True & False Questions (10)

1. Goggles do not need to be worn in the lab, unless told to do so by your instructor.
2. Most chemicals are harmless, so spilling some on your clothes is really no big deal.
3. If you see a Student, involved in horseplay you should immediately expel them from the lab for the day.
4. If you discover a large spill of an unknown liquid, you should clean it up before anyone slips and falls in it.
5. It's okay to eat and drink in the labs.
6. Steel-toed shoes are required in the stockroom.
7. You have a legal right to request information (MSDS) on any chemical in the Laboratory.
8. When mixing an acid with water always add the water to the beaker of acid, because if you spill the water no big deal.
9. It's not important to know how to use an eyewash if you wear your goggles all the time.
10. Chemicals pose no additional risk to a pregnant worker than a nonpregnant worker.

Fill in the blank (6)

1. CHP stands for _____.
2. The person responsible for Institutional Health & Safety is called a (CHO) _____.
3. The person responsible for your actions, be they reckless or careful is _____.
4. Do you know where MSDS sheets are located? _____.
5. What document gives information on the cleaning of chemical spills? _____.
6. What is the first thing you do if you spill acid on your hand? _____.

When finished, take this quiz back to the stockroom. Please make note of any questions you have so they can be discussed with the Stockroom Mgr. The only stupid question is the one you were afraid to ask.

Please Ask Questions!

This is just a small sample quiz. The materials provided will allow for the easy development of many questions,
discussions, and critical thinking sessions.

Spills of reactive chemicals should only be managed by trained responders (who may be in-house). In general, simple spill thresholds for liquids will be lower than the thresholds for solids. Additionally, simple spill thresholds for volatiles will be lower than the thresholds for non-volatiles.Â planning with public emergency response agencies for major chemical emergencies, and. disposal of spill cleanup materials. 1. Releases to the Environment. Emergency Response (Contingency) Plan. A detailed program of action to control and/or minimize the effects of an emergency requiring prompt corrective measures beyond normal procedures to protect human life, minimize injury, to optimize loss control, and to reduce the exposure of physical assets and the environment from an accident. Hazard.Â types of emissions or spills which the plan is designed to address including spills to land, water and air. This should include all dangerous goods and hazardous chemicals being handled along transportation routes and at the particular plant for which the plan is being developed; a list of any other organizations or groups having responsibility under the plan. 3.2 PREPARATION OF A CHEMICAL INCIDENT RESPONSE PLAN 3.2.1 Framework for planning of the chemical emergency response 3.2.2 Local emergency planning guidelines. 3.3 community impact assessment 3.4 incident command 3.5 communication. 3.5.1 Inter-agencies communication 3.5.2 Risk and crisis communication â€“ information and public warnings 3.6 BUILDING HUMAN CAPACITIES 3.6.1 Training 3.6.2 Exercises.Â Public health has an essential role to play in preventing the occurrence of chemical incidents, and minimizing their negative impacts on both the exposed population and the environment should they occur. The purpose of this document is to introduce principles and.