

## **Rules for Safe and Efficient Chemistry Laboratory Operations\***

### **Safety Rules:**



1. *Prepare for each experiment by reading all of the directions before lab starts.*
2. *Locate the Safety Equipment.* Know the locations of the eye wash, safety shower, fire extinguishers, fire blankets, first aid kit, fume hoods, telephone and all exits that are to be used in an emergency. Your laboratory instructor will describe the use of the safety equipment.
3. *Protect your eyes.* Wear approved eye protection at all times. Your laboratory instructor will inform you which of these you must have. Goggles provide maximum safety. Prescription glasses, if you need them, must be worn under approved eye protection. Contact lenses should not be worn in the laboratory because fumes may accumulate under the lenses and injure your eyes and the lenses make it difficult to flush chemicals from your eyes.
4. *Tie long hair back.* This precaution will keep your hair out of burner flames and harmful chemicals.
5. *Do not wear clothing with loose, flowing sleeves.* This precaution will keep your sleeves out of burner flames and harmful chemicals.
6. *Wear shoes that cover all of your feet.* Broken glass on the laboratory floor and spilled chemical reagents are all too common. Shoes that cover your feet completely will protect them from broken glass and chemical splashes. The best types of shoes are closed-toe made out of leather.
7. *Wear clothes that cover your torso and your legs to the knees.* Clothing will give your body needed protection. Good clothing can be protected with a lab apron or coat.
8. *Do not eat or drink in the laboratory.*
9. *Do not taste any chemical reagent.*
10. *Do not smell chemical reagents directly.* When you are instructed to smell a chemical, do so by gently wafting the vapors toward your face. Do not inhale deeply.
11. *Do not pipet solutions by mouth.* Use a rubber suction bulb to fill the pipet.
12. *Do not work with flammable liquids near a flame.*
13. *Do not engage in games or horseplay in the laboratory.* Never run in the laboratory.
14. *Do not attempt unauthorized experiments in the laboratory.*
15. *Do not work in the laboratory in the absence of your instructor or his or her authorized representative.*
16. *Use a fume hood when required.*
17. *Handle glass tubing and thermometers carefully.* When inserting glass tubing or thermometers through a rubber stopper, always hold the glass close to the stopper and use a lubricant such as glycerin to help the glass slide through the stopper. Do not continue to try to force glass through a stubborn stopper, get a new stopper and/or get help. When inserting a pipet into a pipet bulb, hold the pipet near the bulb and GENTLY insert the pipet.
18. *When diluting, never pour water into concentrated reagents.* Always pour the reagent into the water.
19. *If you spill a chemical reagent on yourself, immediately flood the exposed area with water, then summon the laboratory instructor. Inform the instructor immediately about any other accidents or spills.*
20. *Be aware of your neighbors. Are they obeying the safety rules?* A neighbor's accident may injure you.
21. *Avoid touching your face and rubbing your eyes while in the laboratory.* If you must do so, first wash your hands.
22. *Wash your hands before leaving the laboratory.*
23. *Never heat a closed container.* Pressure build up can cause the container to explode.
24. *Assume any chemical is hazardous if you are unsure.*
25. *Do not violate any other safety rule issued by your laboratory instructor.*

**Housekeeping Rules:**

1. *Clean up broken glass immediately with a broom and dustpan. Do not use your hands.* Dispose of broken glass in the special container that is provided, never in a regular trash can.
2. *Chemical spills must be cleaned up immediately.* Immediately notify your instructor who will advise you how to clean it up and/or assist you. Dispose of the collected contaminated chemical properly as instructed.
3. *Do not pour any chemical down into the sink or in the trash without authorization.* Clearly labeled disposal bottles will be provided when needed.
4. *Take containers to the stock of chemical reagents.* Do not bring stock chemicals to your laboratory bench.
5. *Read the label on a reagent bottle carefully.* Is it the correct chemical? Is it the correct concentration?
6. *Do not insert your own pipet, medicine dropper or spatula into a stock bottle.*
7. *Use special care with stoppers or tops of stock bottles.* Do not allow them to pick up contamination. Your instructor will provide additional instructions for handling the stoppers or tops found in your laboratory.
8. *Always replace the stopper or top of a stock bottle when you are finished taking some of the reagent.* Make sure that you put the stopper or top back onto the correct bottle.
9. *When pouring liquid from bottles, hold the bottle with the label against the palm of your hand so that the liquid is poured from the side opposite the label.* If any liquid runs down the outside of the label, immediately wipe off the liquid.
10. *Do not take any more of a reagent than is required.* Many of the chemicals used in the laboratory, including deionized water, are costly.
11. *Never return any unused reagent to a stock bottle.* If you take too much of a chemical, dispose of it as directed by your instructor or offer it to a classmate who needs it.
12. *Set up your glassware and apparatus away from the edge of your laboratory bench.*
13. *Thoroughly clean the area around your laboratory bench and the top of your laboratory bench before leaving lab.*
14. *Keep shared areas of the laboratory clean.* This includes areas such as the balance room and where the stock bottles are stored. It is especially important to keep the balances clean and free of chemical spills.
15. *Keep your laboratory equipment clean.* Good results depend on clean equipment.
16. *If a piece of equipment containing mercury is broken, inform your laboratory instructor immediately.* Keep the area blocked off to avoid scattering the mercury.
17. *Follow any other housekeeping rules given by your laboratory instructor.*



## Comparison of NFPA 704 and HazCom 2012 Labels

|  |  <b>NFPA 704</b>  |  <b>HazCom 2012</b>   |
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| <b>Purpose</b>   | Provides basic information for emergency personnel responding to a fire or spill and 9 those planning for emergency response.  | Informs workers about the hazards of chemicals in workplace under normal conditions of use and foreseeable emergencies.  |
| <b>Number System: NFPA Rating and OSHA's Classification 9 System</b> | 0-4<br>0-least hazardous<br>4-most hazardous   | 1-4<br>1-most severe hazard<br>4-least severe hazard<br><ul style="list-style-type: none"> <li>The Hazard category numbers are NOT 9 required to be on labels but are required on SDSs in Section 2.</li> <li>Numbers are used to CLASSIFY hazards 9 to determine what label information is required.</li> </ul>           |
| <b>Information Provided on Label9</b>                                | <ul style="list-style-type: none"> <li>Health-Blue9</li> <li>Flammability-Red9</li> <li>Instability-Yellow9</li> <li>Special Hazards*-White9</li> </ul> *OX Oxidizers 9<br>W Water Reactives 9<br>SA Simple Asphyxiants 9                      | <ul style="list-style-type: none"> <li>Product Identifier9</li> <li>Signal Word9</li> <li>Hazard Statement(s)9</li> <li>Pictogram(s)9</li> <li>Precautionary statement(s); and9</li> <li>Name address and phone number of 9 responsible party.</li> </ul>  |
| <b>Health Hazards on Label9</b>                                      | Acute (short term) health hazards ONLY.9<br>Acute hazards are more typical for emergency response applications.<br>Chronic health effects are not covered by NFPA 704.   | Acute (short term) and chronic (long term) 9 health hazards. Both acute and chronic health 9 effects are relevant for employees working with chemicals day after day. Health hazards include acute hazards such as eye irritants, simple asphyxiants and skin corrosives as 9 well as chronic hazards such as carcinogens. |
| <b>Flammability/ Physical Hazards on Label9</b>                      | NFPA divides flammability and instability 9 hazards into two separate numbers on the label.<br>Flammability in red section<br>Instability in yellow section  | A broad range of physical hazard classes are listed on the label including explosives, 9 flammables, oxidizers, reactives, pyrophorics, 9 combustible dusts and corrosives.  |
| <b>Where to get 9 information to place on label</b>                  | Rating system found in NFPA Fire Protection Guide to Hazardous Materials OR<br>NFPA 704 Standard System for Identification 9 of the Hazards of Materials for Emergency Response 2012 Edition. Tables 5.2, 6.2, 7.2 and 9 Chapter 8 of NFPA 704 | OSHA Hazard Communication Standard 29 CFR 1910.1200 (2012). 9<br>1) Classify using Appendix A (Health Hazards) 9 and Appendix B (Physical Hazards) 9<br>2) Label using Appendix C 9  |
| <b>Other</b>   | The hazard category numbers found in section 9 2 of the HC2012 compliant SDSs are NOT to be 9 used to fill in the NFPA 704 diamond. 9  | Supplemental information may also appear on the label such as any hazards not otherwise classified, and directions for use.9   |
| <b>website</b>   | <a href="http://www.nfpa.org/704">www.nfpa.org/704</a>   | <a href="http://www.osha.gov">www.osha.gov</a> OR <a href="http://www.osha.gov/dsg/hazcom/index.html">www.osha.gov/dsg/hazcom/index.html</a> 9   |

For more information:



National Fire Protection Association  
[www.nfpa.org](http://www.nfpa.org) | 800.344.35559



**Occupational Safety and Health Administration**  
 U.S. Department of Labor9  
[www.osha.gov](http://www.osha.gov) | 800.321.OSHA (6742)9

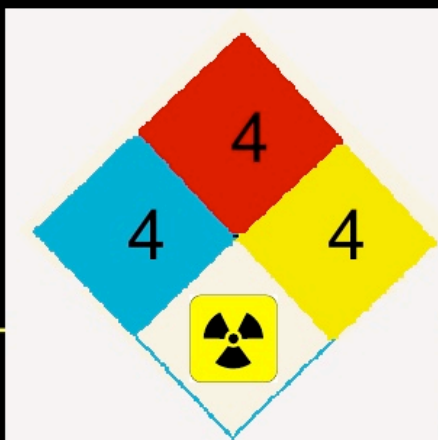
# NFPA 704 System

## Health Hazard

- 4 Deadly
- 3 Extreme Danger
- 2 Hazardous
- 1 Slightly Hazardous
- 0 Normal Material

## Specific Hazard

- ACID = acid
- ALK = Alkali
- COR = Corrosive
- W = use no water



## Fire Hazard








- Flash Points
- 4 Below 73 F
- 3 Below 100F
- 2 Above 100 F not exceeding 200 F
- 1 Above 200 F
- 0 Will not Burn

## Reactivity

- 4 May detonate
- 3 Shock & heat may Detonate
- 2 Violent Chemical Change
- 1 Unstable, if heated

4-Severe, 3-Serious, 2, Dangerous  
1-Minor, 0-None / Negligible

## HCS Pictograms and Hazards

|  |  |  |
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| <b>Health Hazard</b><br><br><ul style="list-style-type: none"> <li>• Carcinogen</li> <li>• Mutagenicity</li> <li>• Reproductive Toxicity</li> <li>• Respiratory Sensitizer</li> <li>• Target Organ Toxicity</li> <li>• Aspiration Toxicity</li> </ul> | <b>Flame</b><br><br><ul style="list-style-type: none"> <li>• Flammables</li> <li>• Pyrophorics</li> <li>• Self-Heating</li> <li>• Emits Flammable Gas</li> <li>• Self-Reactives</li> <li>• Organic Peroxides</li> </ul> | <b>Exclamation Mark</b><br><br><ul style="list-style-type: none"> <li>• Irritant (skin and eye)</li> <li>• Skin Sensitizer</li> <li>• Acute Toxicity (harmful)</li> <li>• Narcotic Effects</li> <li>• Respiratory Tract Irritant</li> <li>• Hazardous to Ozone Layer (Non-Mandatory)</li> </ul> |
| <b>Gas Cylinder</b><br><br><ul style="list-style-type: none"> <li>• Gases Under Pressure</li> </ul>   | <b>Corrosion</b><br><br><ul style="list-style-type: none"> <li>• Skin Corrosion/ Burns</li> <li>• Eye Damage</li> <li>• Corrosive to Metals</li> </ul>  | <b>Exploding Bomb</b><br><br><ul style="list-style-type: none"> <li>• Explosives</li> <li>• Self-Reactives</li> <li>• Organic Peroxides</li> </ul>  |
| <b>Flame Over Circle</b><br><br><ul style="list-style-type: none"> <li>• Oxidizers</li> </ul>   | <b>Environment (Non-Mandatory)</b><br><br><ul style="list-style-type: none"> <li>• Aquatic Toxicity</li> </ul>  | <b>Skull and Crossbones</b><br><br><ul style="list-style-type: none"> <li>• Acute Toxicity (fatal or toxic)</li> </ul>  |

## Laboratory Dress Code

If you come to the lab dressed inappropriately you will be asked to leave!

**1. Wear splash-proof goggles or safety glasses at all times.**

State and Federal law require the use of safety eyewear by anyone working in a chemical laboratory. The Department has approved splash-proof goggles or safety glasses with side shield for this purpose. Both types are available for sale in the Bookstore.

**2. Tie back long hair.**

Long hair can accidentally fall into flames or chemicals. Many hair sprays, gels, mousses, etc. are flammable! Think about this! Loose, long hair can also block your vision, which can lead to accidents.

**3. Do not wear clothing which is loose enough to knock over containers on the work bench or drag or dip into flames or chemicals.**

**4. Wear clothing (shirt, blouse, or dress) which covers and protects your chest, belly, sides, back, shoulders and upper arms. Preferably made of cotton or other natural fibers.**

No cutouts or cutoffs, tank tops, tube tops, muscle shirts, etc. The skin of your torso must not be exposed at any time in the lab.

**5. Wear clothing (pants, very long skirt or very long dress) which covers and protects your body from the waist all the way down to and including your ankles.**

**IF in DOUBT, BUY and WEAR A FULL LENGTH LAB COAT!**

No shorts are allowed. No short or mid-length skirts are allowed.

**6. Wear shoes which cover and protect your feet completely.**

No sandals, flip-flops, open-toed shoes, or shoes with open sides or heels. And no slippers – the top of your foot must be covered!

### Dress Recommendations

**1. Wear comfortable shoes.**

Two hours of walking and standing on a hard tile floor can leave your feet very tired and sore if you wear uncomfortable shoes.

**2. Wear socks.**

They offer added padding for your feet, and extra protection to your ankles.

**3. Wear clothing which "breathes."**

The lab can get very warm. Wear cotton or another natural fiber to keep from overheating yourself in the lab.

**4. Wear clothing which you don't care too much about.**

Tiny splatters or droplets of chemical are very likely to get on your clothing. You might not even know that the droplets are there. But the chemical can stain your clothes or weaken the fibers of the clothing so that the next time you do the laundry your clothes will come out of the dryer with little, fuzzy holes in them.

**5. Come prepared to change clothes.**

If you do not want to spend the entire day dressed in your lab clothes, then BUY a LAB COAT!

**6. Do not wear valuable jewelry while working in the lab.**

Chemicals which are harmless to your body may be capable of damaging jewelry. Take your jewelry off and store it in your purse or book bag before beginning any experiment.

<http://www.science.fau.edu/chemistry/chemlab/General/safety.html#DRESS>

## FOOTHILL COLLEGE

### Department of Chemistry Check-in & Check-out Policies

#### Checking-in. First week of the quarter.

##### Instructors.

1. It is the instructors responsibility to have all registered students check-in to their respective drawers. Instructors distribute the keys, name slips and equipment list. Students return the completed paperwork to the stockroom. The stockroom keeps all the paperwork until check-out. Instructors should make sure no stray chemicals are present in the drawers and provide waste containers as needed.

##### Students.

2. Obtain a key, name slip and equipment list from your instructor. Check the condition of the equipment in your drawer. Examine the glassware carefully. Replace any broken or cracked items with new ones from the stockroom. Please specify to the stockroom staff the size and number of items you need. After the first experiment, you are responsible for the equipment and will have to pay for any missing or broken items.
3. After you have finished checking-in, complete the name slip, ***sign the equipment list***, and then take all your paperwork to the stockroom.
4. After you finish lock your drawer and return your key to the keyboard.

#### Checking-out. Last lab meeting of the quarter.

##### Instructors.

1. It is the instructors responsibility to make sure students are checked-out by the end of the quarter. All stray chemicals are removed and placed in waste containers. All drawers must be checked, especially those from students that have dropped. *Failure to check-out your students and dispose of all stray chemicals will be noted and reported to the Dean for review.*
  - 1.1. Obtain the check-in equipment lists from the stockroom to distribute to the students.
  - 1.2. Make sure no stray chemicals are present in the drawers. (Provide waste containers.)
  - 1.3. After check-out, sign the equipment list and have the student return the list to the stockroom. This completes check-out. Students must return the slip to complete the process.
  - 1.4. Verify with the stockroom the name of any student that failed to check-out.

##### Students.

2. All students are required to check out of their lab drawer during their regularly scheduled check-out time, the last lab meeting. You will not be checked out of your drawer at any other time. Only your instructor can perform a lab drawer check-out, the stockroom personnel are not available for this purpose.
3. If you drop the class, you must come during a regularly scheduled lab time to have your instructor check you out of your drawer. You will not be checked out of your drawer at any other time. Only your instructor can perform a lab drawer check-out, the stockroom personnel are not available for this purpose.
4. Students must return the signed equipment slip to the stockroom to complete the check-out process.
5. **If you fail to check-out of your drawer as described above you will have your course grade reduced at the discretion of your lab instructor.**

## Student Contract

When you sign this document, you are assuring me that you have read and understood the course syllabus (and in particular, the way your grade is computed and lab procedures and policies) and the course calendar. You are also agreeing to all of the operational aspects of the course including attendance and late policies. Please bring the following signed contract with you to class at the second lab meeting. **You will not be allowed to participate in lab activities until this contract is signed and returned.**

As a student in Chemistry Course \_\_\_\_\_ section \_\_\_\_\_ LOCKER # \_\_\_\_\_

I (print name), \_\_\_\_\_

agree to each of the following conditions for taking this course:

1. I have carefully read and understood the following documents:
  - 1.1. **Lecture and Lab Syllabus**
  - 1.2. **Lecture and Lab Calendar**
2. I have carefully read and understand how my grade will be determined. I agree to the conditions in the course syllabus, and understand the consequences associated with acts of academic dishonesty, class disruption and being late for class.
3. I have carefully read and understand lab policies regarding safety, housekeeping, chemical disposal, lateness, attendance and laboratory drawer check-in and check-out. Specifically, **I understand that I will not be allowed in lab to do an experiment while wearing shoes that do not cover all my feet and I understand that I may be dropped from the course if I fail to:**
  - 3.1. follow all written and/or verbal safety and chemical disposal instructions.
  - 3.2. wear approved eye protection at all times when an experiment is in progress.
4. I understand it is my responsibility to check-out of my drawer. Failure to check-out will result in a reduction of my course grade.
5. I have read the **course calendar**, **know the DATE of all exams** and agree to these dates. I understand the make-up or rescheduling of an exam is not permitted.

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Signature

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Date

## Student Contract

### DUE THE SECOND LAB MEETING

When you sign this document, you are assuring me that you have read and understood the course syllabus (and in particular, the way your grade is computed and lab procedures and policies) and the course calendar. You are also agreeing to all of the operational aspects of the course including attendance and late policies. Please bring the following signed contract with you to class at the second lab meeting. **You will not be allowed to participate in lab activities until this contract is signed and returned.**

As a registered student in Chemistry Course \_\_\_\_\_ section \_\_\_\_\_

I (print name), \_\_\_\_\_

agree to each of the following conditions for taking this course:

1. I have carefully read and understood the following documents:
  - 1.1. **Lecture and Lab Syllabus**
  - 1.2. **Lecture and Lab Calendar**
2. I have carefully read and understand how my grade will be determined. I agree to the conditions in the course syllabus, and understand the consequences associated with acts of academic dishonesty, class disruption and being late for class.
3. I have carefully read and understand lab policies regarding safety, housekeeping, chemical disposal, lateness, attendance and laboratory drawer check-in and check-out. Specifically, I **understand that I will not be allowed in lab to do an experiment while wearing shoes that do not cover all my feet and I understand that I may be dropped from the course if I fail to:**
  - 3.1. follow all written and/or verbal safety and chemical disposal instructions.
  - 3.2. wear approved eye protection at all times when an experiment is in progress.
4. I understand it is my responsibility to check-out of my drawer. Failure to check-out will result in a reduction of my course grade.
5. I have read the **course calendar, know the DATE of all exams** and agree to these dates. I understand the make-up or rescheduling of an exam is not permitted.

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Signature

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Date