

# Lesson Plan

Topic: Safety

Objective: The objective is to introduce safety concerns to students who will be working with harmful chemicals.

Standard: Satisfies safety procedures for investigation and experimentation section of CA Science Content Standards

| <b>Time</b> | <b>Activity</b>                                  |
|-------------|--|
| 5 mins      | Brain Storm Safety in a Science Classroom        |
| 15 mins     | Show Power Point presentation on Safety          |
| 15 mins     | Read Safety contract with students               |
| 15 mins     | Make a poster Scene with students working safely |
| 5 mins      | Assessment on Safety                             |

## **Materials needed for this lesson plan:**

Poster paper  
Markers  
Meter Sticks

## **Expected Outcomes:**

Students are expected to know the rules for working safely in a science classroom. The assessment will determine whether the students have mastered the rules and procedures.

## Safety Guidelines for Chemistry



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## Lab's Golden Rule



Personal protective equipment (PPE) must be of the accepted type for the activity and must be worn correctly at all times-by students *and* instructor.

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## Storage of Chemicals

- All chemicals and other hazardous materials must be kept in a properly secured area, clearly and properly labeled, and accounted for at all times. Students must never be allowed to remove hazardous materials from the lab.



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### Working Safely

- Laboratory working conditions must be safe. Safety equipment must be sufficient to deal with the most extreme hazard that could potentially occur.



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### Proper Usage of Equipment

- Proper equipment and supplies must be provided for students to use. They must be given instructions in laboratory technique and in handling materials before being allowed to conduct experiments.



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### Conducting a Lab Experiment

- Instructor must supervise laboratory activities at all times. Students must not perform any unauthorized experiments. During inquiry-based activities, the instructor must approve student-designed experiments before they are performed.



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## Dressing

- Students must dress appropriately for the laboratory. This includes wearing the required PPE, and NOT wearing certain types of personal apparel, including open-toed shoes, shirts with floppy sleeves, and shorts or short skirts. Long hair should be tied back to keep it away from flames and chemicals.



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## Foods and Drinks

- Students must not bring food, drink, or personal items into the work area. After completing the day's activity and cleaning up, they should wash their hands thoroughly to prevent contamination of themselves and their personal effects.



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## Emergency Contacts

- Emergency telephone numbers, including those for the school office, the poison control center, and a hazardous materials service, should be posted in the laboratory. Emergency response and evacuation procedures must be posted and explained to students before the first laboratory session.



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## LCPA Science Student Safety Contract

All students should be able to work in safe laboratories. Permission to work in the science laboratory is a privilege. All students are financially responsible for lost or damaged equipment due to negligent or irresponsible behavior or failure to follow directions. To be afforded this opportunity, you should read the laboratory policy procedure below and sign it.

1. Never perform unauthorized experiments or use any equipment or instruments without proper instruction. Follow all instructions given by the instructor including special directions for all individual experiments.
2. Do not enter the stock/supply rooms. Do not work in the laboratory unless the instructor is present.
3. Proper eye protection is to be worn when the potential for eye injury exists: spilling or splashing of hot or hazardous chemicals. All spills must be cleaned up appropriately. (Inform the instructor of contact lenses.)
4. Proper clothing is to be worn to protect against burns and/or chemical spill: lab aprons/coats. No open shoes, sleeves below elbows, or dangling jewelry is allowed in the laboratory. Long hair is to be tied back or confined.
5. Do not eat, or drink, or smoke anything in the lab at any time. Do not use any lab containers for food or drink.
6. Consider every chemical dangerous. Avoid inhaling fumes, pipetting by mouth, or tasting, touching, or smelling any chemical unless specifically told to do so by the instructor. If chemicals splash on skin or clothing, rinse immediately with large quantities of water.
7. Nothing is to be taken from the laboratory unless checked out to you in writing by the instructor.
8. Never become involved in horseplay or practical jokes.
9. Never force glass tubing into a cork or stopper.
10. Never point a test tube toward yourself or anyone else.
11. Only pins and specimens are allowed in dissecting trays. Instruments not being used are to remain in the kit. Those in use are to be placed on a paper towel beside the tray.
12. Discard only those liquids or solids in the sink as indicated by the instructor.
13. Keep all non-laboratory materials other than notebooks away from all stations.
14. Note the location and be familiar with the operation of any safety equipment.
15. Prior to lab usage, a test shall be administered requiring 100% mastery. The instructor must be immediately notified in the event of an accident.

I have read the above and agree to abide by all conditions and directions given by the instructor.

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Parent signature Date

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Student signature Date

## Laboratory Safety Quiz

Name: \_\_\_\_\_ Per. \_\_\_\_\_ Date: \_\_\_\_\_

1. What is the most essential rule for laboratory safety that will be fully enforced?

- a. always behave responsibly in the lab
- b. be sure to have all of your materials ready
- c. make sure your friends are in your group

2. What should you always wear in the lab?

- a. your favorite concert T-shirt
- b. your protective goggles
- c. long sleeves and long pants
- d. both a and b
- e. both b and c

3. Where is the eye wash station?

- a. in the north east corner of the lab
- b. by the lab door
- c. at the far end of the lab
- d. near group B

4. What should you do if you spill a chemical?

- a. clean it up really fast
- b. notify the students around you
- c. notify Mrs. Franklin
- d. throw some paper towels over the spill
- e. both b and c

5. Playing (as opposed to working) in the laboratory:

- A. is encouraged because you learn more.
- B. is not dangerous.
- C. is OK if you are working too.
- D. will result in loss of laboratory privileges.

6. In a laboratory, you should be cautious of:

- A. flammable clothing.
- B. dangling jewelry.

- C. loose clothing.
- D. all of the above.

7. Long hair in the laboratory must be:

- A. always neatly groomed.
- B. held away from the experiment.
- C. kept entirely out of the way.
- D. cut short.

8. The following footwear is BEST in the laboratory.

- A. weather-appropriate shoe
- B. closed shoes
- C. sandals
- D. open-toed shoes
- E. any of the above

9. If a chemical is splashed on you or your clothing, wash at once with:

- A. plenty of running water.
- B. soap
- C. vinegar
- D. a weak base.

10. You are heating a substance in a test tube. Always point the open end of the tube:

- A. toward your lab partner.
- B. toward another classmate.
- C. toward yourself, so you can see what's going on.
- D. toward no other person.

## Laboratory Inspection Checklist

Conducted By: \_\_\_\_\_ Date of Inspection: \_\_\_\_\_

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Location (room # & building): \_\_\_\_\_

Principal Investigator/Supervisor: \_\_\_\_\_

### I. Laboratory Work Practices

|   | Yes/No | Comments |
|---|--------|----------|
| ✓ No smoking, food & beverages rules are observed.  | Yes/No |          |
| ✓ Food and beverages are not stored in the laboratory areas, refrigerators or in glassware that is also used for laboratory operations. |        |          |
| ✓ Pipetting is performed by mechanical means.   | Yes/No |          |
| ✓ Laboratory surfaces are cleaned; disinfected or decontaminated after work is performed.   | Yes/No |          |
| ✓ Required PPE is being worn.   | Yes/No |          |
| ✓ Used needles are stored in appropriate sharps containers  |        |          |
| ✓ Syringes are needle locking..   | Yes/No |          |
| ✓ No recapping of needles is performed.   | Yes/No |          |
| ✓ Hoods are not being used for storage.   | Yes/No |          |

### II. Housekeeping

|  | Yes/No | Comments |
|--|--------|----------|
| ✓ Laboratory and storage areas uncluttered and orderly (including benchtop). | Yes/No |          |
| ✓ Aisles & exits are free from obstruction.                                  | Yes/No |          |
| ✓ Work surfaces are protected from contamination.                            | Yes/No |          |
| ✓ Electrical cords are in good condition and are UL listed.                  | Yes/No |          |
| ✓ Tools and equipment are in good repair and electrically grounded.          | Yes/No |          |
| ✓ Tops of cabinets and shelves are free from stored items.                   | Yes/No |          |
| ✓ Heavy objects are confined to lower shelves.                               | Yes/No |          |
| ✓ Glassware is free from cracks, chips, sharp edges and other defects.       | Yes/No |          |
| ✓ Broken glass containers are available and in use.                          | Yes/No |          |

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Laboratory Safety Inspection Checklist

| III. Personal Protective Equipment  |        |          |
|---|--------|----------|
|   | Yes/No | Comments |
| ✓ Protective gloves are available and matched to hazards involved.  | Yes/No |          |
| ✓ Eye protection is available and in use in all laboratories.   | Yes/No |          |
| ✓ Lab coats, tyvek garments etc. are available and in use.  | Yes/No |          |
| ✓ Lab coats are only worn in the laboratory and are removed before entering offices, lunchrooms, rest rooms, conference rooms and other non-laboratory general use areas. (This includes disposable protective clothing). | Yes/No |          |
| ✓ Dirty lab coats/uniforms are stored in a covered container until removed for laundering.  | Yes/No |          |
| ✓ Appropriate protective clothing is available and in use when working with radioactive materials.  | Yes/No |          |
| ✓ Respirators are provided when necessary, and selected on the basis of hazard present.   | Yes/No |          |
| ✓ Respirators are used correctly, cleaned after every use and stored in a convenient, clean and sanitary area.  | Yes/No |          |

| IV. Hazard Communication  |        |          |
|---|--------|----------|
|   | Yes/No | Comments |
| ✓ Primary & secondary chemical containers are labeled with identity, appropriate hazard warnings, and expiration dates. | Yes/No |          |
| ✓ Signs on storage areas (e.g. Refrigerators) and laboratories are consistent with hazards within.                      | Yes/No |          |
| ✓ MSDS binders are available for chemicals used and stored in area.   | Yes/No |          |
| ✓ Employees know the location of the MSDS binders for their work area.  | Yes/No |          |
| ✓ Satellite MSDS collections are complete and readily available at all times to labs.                                   | Yes/No |          |

| V. Chemical Storage  |        |          |
|--|--------|----------|
|  | Yes/No | Comments |
| ✓ Incompatible materials are segregated.   | Yes/No |          |
| ✓ Corrosives and flammables are stored below eye level.  | Yes/No |          |
| ✓ Hazardous materials used/stored in the laboratory are limited to small quantities.                   | Yes/No |          |
| ✓ Unnecessary, unused, or outdated materials are removed from laboratories and chemical storage areas. | Yes/No |          |
| ✓ Safety carriers are available and in use while transporting chemicals.                               | Yes/No |          |
| ✓ All lab carts have side-rails.   | Yes/No |          |
| ✓ All containers are properly labeled with: <b>Name, Date, Contents, Lab #</b>                         | Yes/No |          |

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| VI. Flammable Liquids Storage & Handling  |        |          |
|---|--------|----------|
|   | Yes/No | Comments |
| ✓ Flammable liquids are stored and used away from ignition sources.   | Yes/No |          |
| ✓ Bulk quantities of flammable liquids are stored in approved storage cabinets.                                 | Yes/No |          |
| ✓ Flammable liquid storage cabinets are properly labeled.   | Yes/No |          |
| ✓ Flammable liquid storage cabinets close properly.   | Yes/No |          |
| ✓ Flammables stored on open shelves in glass or plastic containers are within permissible quantities (limit = ) | Yes/No |          |
| ✓ Safety cans used to handle small quantities of flammable liquids are properly labeled.                        | Yes/No |          |
| ✓ Solvent waste cans are labeled properly with: <b>Name, Contents, Lab #.</b>                                   | Yes/No |          |
| ✓ Nothing is stored on top of flammable cabinets.   | Yes/No |          |

| VII. Compressed Gas Cylinders  |        |          |
|--|--------|----------|
|  | Yes/No | Comments |
| ✓ Gas cylinders are properly chained/secured.  | Yes/No |          |
| ✓ Cylinder caps are in place when cylinders are not in use or being moved.           | Yes/No |          |
| ✓ Gas cylinders are transported on a cart with chains.                               | Yes/No |          |
| ✓ Gas cylinders are stored away from excessive heat.                                 | Yes/No |          |
| ✓ Fuel gas cylinders are at least 20 feet away from oxygen cylinders.                | Yes/No |          |
| ✓ Gas cylinders are properly marked as to their contents.                            | Yes/No |          |
| ✓ Full and empty cylinders are stored separately.                                    | Yes/No |          |
| ✓ Empty gas cylinders are labeled "EMPTY".   | Yes/No |          |
| ✓ Gas lines, piping, manifold, etc. are labeled with the identity of their contents. | Yes/No |          |
| ✓ Hoses, tubing and regulators are in good working condition.                        | Yes/No |          |

| VIII. Waste Handling: Hazardous, Non-Hazardous & Biological  |        |          |
|--|--------|----------|
|  | Yes/No | Comments |
| ✓ No liquid waste is disposed of in the sinks or the sewer.  | Yes/No |          |
| ✓ Hazardous wastes are not accumulated for longer than one month in the laboratory.  | Yes/No |          |
| ✓ Waste streams are separated as necessary: ex. Solid vs. liquid, hazardous vs. non-hazardous, halogenated vs non-halogenated, etc.. | Yes/No |          |
| ✓ Waste containers are appropriately tagged before placing in waste room.  | Yes/No |          |
| ✓ Containers of hazardous waste are labeled properly with the date and name of person discarding waste.                              | Yes/No |          |
| ✓ <b>Biological waste</b> is appropriately marked with a biohazard symbol.   | Yes/No |          |
| ✓ Syringes and other sharp waste are disposed of into a sharps container and placed directly into biohazard waste container.         | Yes/No |          |
| ✓ Waste material is not allowed to accumulate on the floors, in corners or under shelves/tables in laboratories.                     | Yes/No |          |
| ✓ <b>Radioactive waste</b> is properly marked with radiation symbol.   | Yes/No |          |

| IX. Means of Egress and Emergency Exits |        |          |
|---|--------|----------|
|   | Yes/No | Comments |
| ✓ Exits are clearly marked.             | Yes/No |          |

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Laboratory Safety Inspection Checklist**

|   |        |  |
|---|--------|--|
| ✓ Exits are free from obstruction.                            | Yes/No |  |
| ✓ All fire doors are self-closing.                            | Yes/No |  |
| ✓ All fire doors are kept closed.                             | Yes/No |  |
| ✓ Fire alarms are provided.                                   | Yes/No |  |
| ✓ Telephones are labeled with emergency numbers.              | Yes/No |  |
| ✓ Emergency evacuation routes are clearly posted.             | Yes/No |  |
| ✓ Emergency evacuation routes are posted in common hallways.  | Yes/No |  |
| ✓ Emergency exit lights are working and clear of obstruction. | Yes/No |  |

**X. Safety Equipment**

|  | <b>Yes/No</b> | <b>Comments</b> |
|--|---------------|-----------------|
| ✓ Safety showers and eye wash stations are located within 75' of all laboratories.                           | Yes/No        |                 |
| ✓ Safety showers and eye wash stations are clearly labeled, and these areas are clear from obstruction.      | Yes/No        |                 |
| ✓ All showers and eye wash stations are clean, covers are replaced and they in good working condition.       | Yes/No        |                 |
| ✓ Fire extinguishers are available.  | Yes/No        |                 |
| ✓ Fire extinguishers are the appropriate type for the hazard in the work area.                               | Yes/No        |                 |
| ✓ Fire extinguishers are checked monthly. Date of last check:  | Yes/No        |                 |
| ✓ Fire detection devices, smoke alarms, sprinkler systems, lighted exit signs are in good working condition. | Yes/No        |                 |
| ✓ First-aid supplies are readily available and clearly visible.  | Yes/No        |                 |
| ✓ Spill team list is clearly posted in laboratories.   | Yes/No        |                 |

**XI. Other Labeling & Posting**

|   | <b>Yes/No</b> | <b>Comments</b> |
|---|---------------|-----------------|
| ✓ Warning signs and labels are present whenever required (e.g. carcinogen, mutagen) where chemicals are stored.                                       | Yes/No        |                 |
| ✓ "No Smoking" signs are posted in prohibited areas.  | Yes/No        |                 |
| ✓ "Caution- Radioactive Material" signs are posted on doors of all authorized laboratories, and on refrigerators/freezers where materials are stored. | Yes/No        |                 |
| ✓ Biohazard symbols are posted on access doors to biohazard laboratories and animal rooms and on potentially contaminated equipment.                  | Yes/No        |                 |

**XII. Miscellaneous & Notes**

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