



## Science Classroom Laboratory Safety

### ***Objective:***

- Learn safety rules for working with chemicals and participating in a safe manner when carrying out lab procedures.
- Complete the safety and equipment quiz with teacher satisfaction

### ***Introduction:***

The science classroom laboratory with its equipment, glassware, and chemicals has the potential for accidents. In order to avoid dangerous accidents, or to minimize their damage, precautions must be taken by every student to insure the safety of everyone working in the laboratory. Following the safety rules for handling chemicals and carrying out procedures will help to create a safe environment in the laboratory. Read the rules in the following sections of this lab and complete the questions in the lab report. Complete the safety quiz, then sign and submit the lab safety contract. If you need special assistance, please inform your instructor at the first lab meeting and list the need in the appropriate space on the following pages.

### **Laboratory Activities**

#### **A. Preparing for Laboratory Work**

- 1. Pre-read** - Since you have been given a laboratory schedule, you are expected to read the experiment *before* you come to the laboratory. Ask your instructor about anything you do not understand.
- 2. Do assigned work only** - Do only experiments that have been assigned by your instructor. No unauthorized experiments are to be carried out in the laboratory. Experiments are to be done at assigned time and no make-up lab opportunities will be available. Do not work alone in a laboratory.
- 3. Wear proper clothing for protection** – For proper eye protection, safety goggles are provided for each student and worn when your instructor instructs you to do so in the lab. Loose sleeves, shorts, or open-toed shoes can be dangerous. Shoes are necessary for the lab and no student may work in the lab with open toed sandals when chemicals are being used. Long hair should be tied back so it does not fall into chemicals.
- 4. Safety awareness** - Learn the location and use of the emergency eyewash stations, the fire extinguishers and blanket, first aid kit, biohazard bucket (when needed), glass disposal container, and exits. Memorize their locations in the laboratory. Be aware of others working in the lab. Never use chipped or cracked glassware. Broken

glassware should be discarded in a special “glass only” container. Biohazards should be disposed of in the biohazard containers.

- 5. No food allowed - *NO FOOD OR DRINK IS ALLOWED IN THE LABORATORY AT ANY TIME.*** Always wash your hands before you leave the lab.
- 6. Prepare your work area** - Before you begin a lab, clear the lab table of all your personal items such as backpacks, books, sweaters, and coats. These can be stored at your desk. All you will need at your lab station is your lab material and a pen or pencil.
- 7. Use of Lab Stools** - Lab chairs are available for use in the room throughout the semester. When not in use, chairs need to be pushed under the corner of the lab table. Keep the aisles clear.
- 8. Pre-labs** – Pre-labs must be completed before lab begins. If you do not complete the pre-lab, you will not be allowed to participate in the lab resulting in a zero for that lab.

### Handling Chemicals Safely

- 1. Eye injury - *Safety goggles must be worn when your instructor indicates. This will be listed in the laboratory reading.*** It is your responsibility to read the laboratory introduction and procedure before you come to lab. If a chemical should splash into your eyes, flood the eyes with water at the eyewash fountain and continue to rinse with water for at least ten minutes.
- 2. Use small amounts** - Pour or transfer a chemical into a small clean container (beaker, test tube, flask, etc) taken from your lab station. Take only the quantity of chemical that you need. Most of the chemicals you will use during each experiment will be located at your lab station or on the counter along the wall.
- 3. Do not return chemicals to the original containers** - To avoid contamination of chemicals, dispose of used chemicals according to your instructor’s instructions. **NEVER return unused chemical to reagent bottles.** Some liquids and water-soluble compounds may be washed down the sink with plenty of water, if told to do so. Metallic & organic compounds should always be disposed of in labeled disposal containers.
- 4. Massing a reagent** - Never place a reagent directly on the balance pan when massing reagents. Always use a weighing tray, weighing paper, or small beaker. The balance can automatically compensate for the weight of the container.
- 5. Never taste chemicals. Always smell a chemical cautiously.**

- 6. Do not shake laboratory thermometers** - Lab thermometers respond very quickly to their environment – shaking is unnecessary and can cause breakage.
- 7. Laboratory accidents** - Always notify your instructor of any chemical spill or accident in the laboratory. If you have a condition which limits your ability to work safely in the lab, let the instructor know immediately. Should you become injured in any way during a laboratory, inform your instructor immediately.
- 8. Read labels carefully.**

## **B. Heating Chemicals Safely**

- 1. Heat substances in heat-resistant glassware only.** Glassware marked Kimax or Pyrex can be heated. Never use any other type of glassware. To heat solid or liquids in a test tube, hold the tube in a test tube holder at an angle, not upright. Move the test tube continuously as you heat the sides and bottom. Don't forget, hot glassware looks the same as cool glassware. NEVER place hot objects on a balance and NEVER leave a hotplate burner unattended.
- 2. Flammable liquids** - Never heat a flammable liquid over an open flame. If heating is necessary, use a hot plate.
- 3. Never heat a sealed container.**
- 4. Fire** - Small fires can be extinguished by covering them with a watch glass. If a larger fire is involved, contact your instructor immediately.

## **C. Chemical Contamination**

- 1. Check labels twice** - Be sure you are using the correct chemical. **DOUBLE CHECK THE LABEL** on the bottle before you remove the chemical. To avoid contamination of the chemical reagents, **never** insert droppers, pipettes, or spatulas into reagent bottles.
- 2. Do not return chemicals to the original containers** - To avoid contamination of chemicals, dispose of used chemicals according to your instructor's instructions. **NEVER return any unused chemical to reagent bottles.** Some liquids and water-soluble compounds may be washed down the sink with plenty of water, if told to do so. Metallic & organic compounds should always be disposed of in proper disposal containers.
- 3. Liquid spills** - Spills of liquids should be cleaned up immediately.
- 4. Never leave reagent bottles uncapped.**

5. **Always use a different spatula** or wooden splint for each different reagent.
6. **Clean up** - Wash glassware as you work. Place glassware on the drying racks to dry. Make sure you leave a clean work area.

#### D. Use of Material Safety Data Sheets (MSDS)

Many chemicals have dangers associated with their use. One way of combating these dangers is by the use of Materials Safety Data Sheets (MSDS), which are provided by each manufacturer or vendor as required by law for the chemicals purchased and used in our lab. The information given relates to the risks involved when using a specific chemical. These sheets are available to you as a student for each chemical used in the experiments that you will perform this semester.

A copy of the MSDS for methylene blue solution is included for you to see. A typical MSDS is divided into several general sections:

Section 1: Chemical Product and Company Identification

Section 2: Composition, Information on Ingredients, and CAS #

Section 3: Hazards Identification

Toxicity Hazards

Fire and Explosion Data

Health Hazard Data

Reactivity Data

Section 4: First Aid Measures

Section 5: Fire Fighting Measures

Section 6: Accidental Release Measures

Section 7: Handling and Storage

Section 8: Exposure Controls, Personal Protection

Section 9: Physical and Chemical Properties

Section 10: Stability and Reactivity

Section 11: Toxicological Information

Section 12: Ecological Information

Section 13: Disposal Considerations

Section 14: Transport Information

Section 15: Regulatory Information

Section 16: Other Information

## E. The Fire Diamond

All of the solutions that you will be using in the lab will have a fire diamond label on them. This indicates the hazards of the chemical. The diamond is subdivided into four quadrants. Quadrant A (blue) refers to *health hazards*, quadrant B (red) deals with *flammability*, quadrant C (yellow) deals with *reactivity or stability*, and quadrant D (white) carries other *specific hazards*. This system uses a rating scale from 0 to 4, where 0 stands for the least danger and 4 stands for the most danger.

### Position A: Health Hazard (blue)

- 0 = Ordinary combustible hazards in fire
- 1 = Slightly hazardous
- 2 = Hazardous
- 3 = Extreme danger
- 4 = Deadly

### Position B: Flammability (red)

- 0 = Will not burn
- 1 = Will ignite if preheated
- 2 = Will ignite if moderately heated
- 3 = Will ignite at most room conditions
- 4 = Burns readily at room conditions

### Position C: Reactivity, instability (yellow)

- 0 = Stable and unreactive with water
- 1 = Unstable if heated
- 2 = Violent chemical change
- 3 = Shock and heat may detonate
- 4 = May detonate

### Position D: Special hazard (white)

OX = oxidizer, etc.

