

LABORATORY SAFETY

Safety is of the utmost importance in a laboratory. The rule is:
If it can't be done safely, don't do it.

Laboratory hazards fall into 4 main categories:

1. Chemical hazards - including chemical spillage, chemical burns, poisoning
2. Fire hazards - including open flame burners, ignition of volatiles, spontaneous combustion
3. Burns to the skin due to heat or flame
4. Cuts and lacerations - due to glassware or equipment breakage or explosion

Accident Prevention

1. Before using any chemical reagent, always read the safety information on the label.
2. Always wear protective clothing: lab coat, lab apron, gloves, goggles, full face shield, as indicated by the nature of the hazard.
- * 3. Always review potentially hazardous procedures in full before proceeding.
4. Always observe caution when carrying out any step of a laboratory procedure.
- * 5. Never use volatile organic solvents near open flames.
6. Always use the fume hood for noxious or dangerous fumes.
7. Never pipet anything by mouth - use a pipet bulb or automatic pipettor.

Safety Equipment

Know the location and use of:

- fire extinguisher
 - eye wash fountain
 - safety shower
- fire alarm ●

Accidents

IN CASE OF A CHEMICAL SPILL

- Identify the material spilled.
- * • Report the spill to the teacher.
- Consider means to contain and/or neutralize the substance.
- Do not attempt to use water to dilute immiscible organic materials.

IN CASE OF BURNS (including chemical burns)

- most common * • Put burned area under gently running *cold* water or immerse in sink full of cool water.
- Place a bag of ice, frozen peas, corn, etc. against the burn.
- Never put grease on a burn.
- Never attempt to neutralize a chemical burn with another chemical.
- common * • If a chemical splashes into the eyes, immediately flush with copious amounts of cold water - use eye wash fountain.
- If a large quantity of dangerous chemical is spilled on the person, remove clothes and use the shower.
- Report burn to teacher.

IN CASE OF POISONING

- Report incident to teacher immediately.
- Obtain medical help.

IN CASE OF CUTS

- Put cut under cold running water.
- Elevate the cut area.
- Report cut to teacher.
- Where is the first aid box located? _____

IN CASE OF FIRE

- Identify the source and type of fire.
- Consider the various methods available to smother the flames: lid, baking soda, salt, fire extinguisher, fire blanket.
- If a victim is on fire, cover him/her completely in a fire blanket.
- Do not use water on electrical or solvent fires!
- Where is the nearest fire alarm? _____

FIRE DRILL PROCEDURE

- turn off bunsen burners and electrical equipment.
- close doors and windows when leaving.
- Stay together and follow teacher outside for attendance check.
- Do not talk, run or panic. Listen for instructions.

SAFE SCIENCE:
Lab Safety Awareness

Symbols/Icons and Rules/Guidelines

Symbols

Hazard - example(s) and rules or guidelines

Glassware Hazard



Breakables - glass containers

- You will be working with easily broken material; handle it with care.
- Do not use chipped, cracked or broken glassware.
- Do not heat or cool glassware that is not designed to withstand large temperature changes. Use Pyrex, Kimax or TEKK glassware for heating or cooling.
- Do not heat glassware that is not thoroughly dry.
- Be sure you do not pick up glassware that may be hot or very cold unless you use holders or insulated materials.
- Clean glassware thoroughly before putting it away.

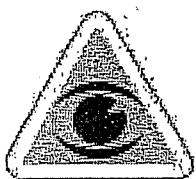
Electrical Hazard



Electrical hazard/sparks

- Do not use long extension cords in the lab.
- Do not overload one socket or circuit (it may cause a fire).
- Do not use electrical equipment or touch an outlet or wire with wet hands.
- Be sure plug is solidly inserted in the socket.
- Remember that people conduct electricity.
- Avoid getting outlets/electrical equipment wet. Most electrical appliances are NOT designed to be used with liquids.
- Be sure electrical equipment is grounded.

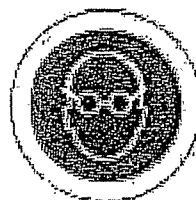
Eye Hazard



Eye hazard - flying object, splash

- Protect your eyes with goggles.
- When you heat the contents of containers (tubes, flasks, beakers), rotate the container continually, using tongs, gloves or other appropriate heat-resistant material. Hold the container so it is pointed away from your body and pointed away from others. Some labs are equipped with hot plates that have built in magnetic stirring devices. Remove magnetic stirring bars with a magnet; do not reach in to retrieve it with bare hands.

Eye Protection



(Continued on Blackline Master 2)

SAFE SCIENCE:
Lab Safety Awareness

Symbols/Icons and Rules/Guidelines (continued)

Fire Hazard



Flammable material - volatile liquid, combustibles, organic solvents

- Always wear goggles when using a flame or other heat source.
- Never heat anything in the laboratory - especially chemicals - unless instructed to do so.
- Never reach across a flame.
- Always use a clamp, tongs, or heat-resistant gloves or pot holders to handle hot objects.
- Be sure the work area is clean and uncluttered when using a flame.
- Use safety matches to light candles or torches and safety matches or strikers to light Bunsen burners.
- Be sure matches are out by dipping them in water before discarding them.

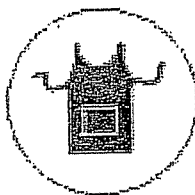
Poison Hazard



Poison

- Never smell any chemical directly from its container. Waft odors from the top of the container with your hand, guiding the fumes toward your nose; only do this when instructed.
- Do not mix chemicals unless instructed to do so.
- Do not taste chemicals unless instructed to do so.
- Do not handle chemicals unless instructed to do so.
- Keep all containers (such as jars and bottles) closed tightly when chemicals are not in use. Take out of the main supply only the amount of each chemical that you need. Extra material should not be put back in the original container.
- Dispose of chemicals according to instructions from the teacher or directions in a book or instruction sheet.
- If any chemical gets on your skin or clothing, rinse it with water FIRST. Then notify the teacher.
- Protect your hands appropriately.

Clothing Protection



Need for protective clothing

- Corrosive substances, burning substances, toxic materials flammable materials, and poisons pose hazards.
- Anyone working in a lab needs to protect him/herself and clothing from splatters, spills, broken glass, debris and stains.

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SAFE SCIENCE:
Lab Safety Awareness

Symbols/Icons and Rules/Guidelines (continued)

Hand Hazard



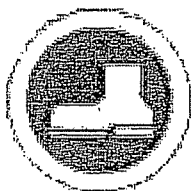
Hand safety

- Protective gloves should be worn or special equipment or tools used to protect against acids, toxic substances, poisons, hot or very cold materials, or materials that may be contaminated with harmful microorganisms.
- Wear appropriate gloves (heat-resistant, acid-resistant or contamination-resistant).
- Do not force glass tubing or thermometers into rubber stoppers. Moisten the glass with water, and hold the tube/thermometer with a towel. Twist firmly but without great force. If in doubt, ask the teacher for help.
- Do not pick up broken glass with bare hands.
- Do not use thermometers outside the temperature range for which they were designed; they could break.

Hand Protection



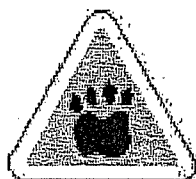
Foot Protection



Foot safety - protective footwear should be worn to protect against liquid or solid spills, sharp objects, heavy objects falling

- Wear closed-toe shoes in the lab to minimize the risk of something heavy, burning or sharp harming your feet.

Animal Hazard



Animal safety and animal care - Reminder not to harm any animal (mammals, birds, fish, reptiles or amphibians) unnecessarily during observations or experimentation.

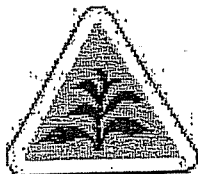
- Handle animals only if necessary.
- Do not cause pain, discomfort or injury to an animal in the lab; treat animals humanely.
- Handle animals only as your teacher directs.
- Frightened, pregnant, feeding or nursing animals require special handling.
- After handling animals or their cages, wash your hands thoroughly.
- Do not knowingly use pregnant or sick animals in experiments without a good reason and with approval of a committee that reviews procedures dealing with animal safety.

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SAFE SCIENCE:
Lab Safety Awareness

Symbols/Icons and Rules/Guidelines (continued)

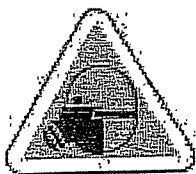
Plant Hazard



Plant safety and care

- Remember that some plants may be poisonous or have sharp components.
- Some people are allergic to plant components or oils on a plant's surface; if you think you may be allergic to something, inform the teacher.

Gas Protection



Gas precaution

- Toxic fumes may be present.

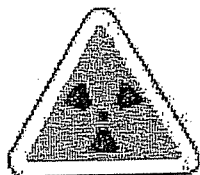
Sharpness Hazard



Sharp instrument safety

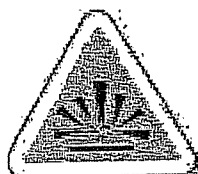
- Use single-edged razors or instruments designed for dissection or cutting in the lab; do not improvise.
- Handle sharp instruments carefully.
- Cut away from you.
- If you are cut or jabbed, report to your teacher immediately. (Remember first aid principles; hold cut hands/arms up to minimize blood loss; if an artery is cut, a tourniquet must be applied. Call an emergency number and the school nurse at once.)
- Note lab instruments are generally not sterile!

Radiation Hazard



Radiation hazard; radioactive materials are rarely used in early science training, however, if radioactive materials are used, there is need for precautions - especially since radiation isn't smelled or seen.

Explosion Hazard



Explosion hazard; early lab science training exercises rarely result in explosions, however, if there is potential for an explosion, there is extreme need for precautions (skin, eye safety in particular for even the smallest of explosions).

Name _____

SAFE SCIENCE:
Lab Safety Awareness

Major General Laboratory Safety Rules and Reasons

RULE	REASON(s)
Never eat or drink in the lab.	
Never eat or drink from laboratory glassware.	
Do not run or play roughly in the lab.	
Do not play practical jokes in the lab.	
Do not perform experiments unless instructed by your teacher. Don't mix chemicals or "fun."	
Avoid spilling material in the laboratory. If anything spills, call your teacher immediately. Ask the teacher about the correct procedure for cleanup.	
If an accident occurs, report it to your teacher promptly.	
Keep equipment and work areas clean and organized.	
Be sure all gas jets or valves, electrical connections and water faucets are turned off when you are through with them or at the end of the lab period.	
Wear eye protection, aprons or lab coats, closed-toe shoes and other safety protection as directed by your teacher or the instructions in your book.	
Read labels on containers with care before using their contents.	
Carry microscopes and other pieces of equipment with both hands, using one hand to support the instrument from underneath.	

Continued on Blackline Master 9)

**SAFE SCIENCE:
Lab Safety Awareness**

Major General Laboratory Safety Rules and Reasons (continued)

RULE	REASON(s)
Follow instructions with care about the handling and management of live animals.	
Follow safety instructions precisely as stated in your book and/or by your teacher. Always obtain permission from your teacher before experimenting on your own. Do not perform any activities that have not been approved by your teacher.	
Never use broken or chipped glassware. If you notice a chip, crack or break, inform your teacher immediately. Dispose of the glassware in the proper container.	
Learn the meaning of every safety symbol used in the lab.	
Always wash your hands after each laboratory experiment, or whenever your hands have been exposed to anything that might harm you.	
Wash your hands after handling animals or animal cages.	
Read instructions for an experiment several times. Be sure you understand each of them. Follow directions exactly. For example add acid to water, not water to acid. If you are not sure about any part of the directions, ask your teacher for help.	
Never return chemicals to their original containers. Dispose of extra material you do not need according to your teacher's directions.	