Chemistry 20
Process Skills, Lab Safety & Lab equipment

Process Skills

1) Questioning
2) Proposing Ideas
3) Designing an experiment
4) Observing & Measuring
5) Processing Evidence
6) Interpretation of Evidence

Step 1: Questioning

- ✓ **Problem:** What effect does *manipulated variable* have on the *responding variable*.
- ✓ **Variables:**
  - Manipulated: 1st variable changed
  - Responding: 2nd variable that reacts to 1st
  - Controlled: variables that are kept the same

Step 2: Proposing Ideas

- **Background Information:** What do you already know?
- **Hypothesis:** I hypothesis that (***answer)*** because (***logical reason based on background)***. I will test this by …
- **Prediction:** I predict that (***answer with quantitative data based on background)***

Step 3: Designing Experiments

- **Prelab Calculations:** Show any calculations that need to be done before the experiment.
- **Materials & equipment:** List the materials and equipment required to do the lab. Include sizes & amounts if known.
- **Cautions**: State any safety issues.
- **Procedure**: Make a step by step account of how the experiment is to be done. OR "Look at ...."

Step 4: Observing and Measuring

- **Observations:** Write down qualitative (qualities) and quantitative (amounts) observations. Include LABELED charts, tables and diagrams if appropriate.

Step 5: Processing Data

- **Analysis:** Complete any calculations, charts or tables. Create an appropriate graph. Answer questions posed by the data.
- **Line Graphing:**
  - Make a title (use pencil & ruler)
  - Label & Scale you axis so it covers ½ the page
  - Plot your points with circles.
  - Draw an appropriate graph (exponential, straight line of best fit, sigmoid or curved)
  - Calculate the slope for straight lines(rise/run)
  - Add a key if more than two lines present.

Step 6: Interpretation

- **Conclusion:**
  - Did the data support the hypothesis, problem, or prediction? Why or why not
  - What conclusion(s) are supported by the data? (State the data.)
  - What improvements could be made to the experiment?
  - What instrumental or human errors may have occurred?
- **Extension:**
  - What new questions or investigations could be done in the future? (Site references.)

Lab Safety

Everyone is
RESPONSIBLE

Safe Practices

1) No fooling around.
2) Pre-lab preperation is the key to safety
3) Wear lab coats and closed shoes.
4) Contacts need to be removed. Safety glasses are recommended
5) Tie back long hair or loose clothes.
6) Remove jewlery.
7) Report all accidents

Broken Glass

- ✓Is The most common accident in the lab.
- ✓If glassware is broken, report it to your teacher immediately.
- ✓Follow the teachers instructions when cleaning up the glass.

Cuts & Scrapes

- ✓Report all cuts immediately
- ✓There is a possibility for infection .
- ✓Do not come into contact with another person's blood .
- ✓If there is blood go to your seats and wait for instructions.

Chemical Spills

- ✓ Treat all spills as **dangerous**.
- ✓ Report spills to your teacher and wait for instructions.
- ✓ Consult MSDS for special instructions.

Fire

- ✓Bunsen burners are the most common source of fires
- ✓Turn off the burner when not using them.
- ✓If a paper fire occurs, push the paper into the sink and turn on the water.

continued

Fire

- ✓ Clothing or hair is the most dangerous type of fire.
- ✓ Cover clothing or hair fires with a fire blanket or use the shower.
- ✓ The teacher should be the only one to use the fire extinguisher.

continued

Safety Equipment:

KNOW the locations of the

- ✓ Eye Wash Station
- ✓ Safety Shower
- ✓ Fire Safety Blanket
- ✓ Fire Extinguisher
- ✓ Reaction Chamber

Lab Safety

NEVER ENDS

MSDS & WHMIS

Material Safety Data Sheets & Workplace Hazardous Materials Information System

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

Form Approved
OMB No. 44-R1367

MATERIAL SAFETY DATA SHEET

Required under USDL Safety and Health Regulations for Ship Repairing, Shipbuilding, and Shipbreaking (29 CFR 1915, 1916, 1917)

SECTION I

MANUFACTURER'S NAME	EMERGENCY TELEPHONE NO.
ADDRESS *(Number, Street, City, State, and ZIP Code)*	
CHEMICAL NAME AND SYNONYMS	TRADE NAME AND SYNONYMS
CHEMICAL FAMILY	FORMULA

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS		
OTHERS					

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)

SECTION III - PHYSICAL DATA

BOILING POINT (°F.)		SPECIFIC GRAVITY (H_2O=1)	
VAPOR PRESSURE (mm Hg.)		PERCENT, VOLATILE BY VOLUME (%)	
VAPOR DENSITY (AIR=1)		EVAPORATION RATE (_____ =1)	
SOLUBILITY IN WATER			
APPEARANCE AND ODOR			

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used)	FLAMMABLE LIMITS	LEL	UEL

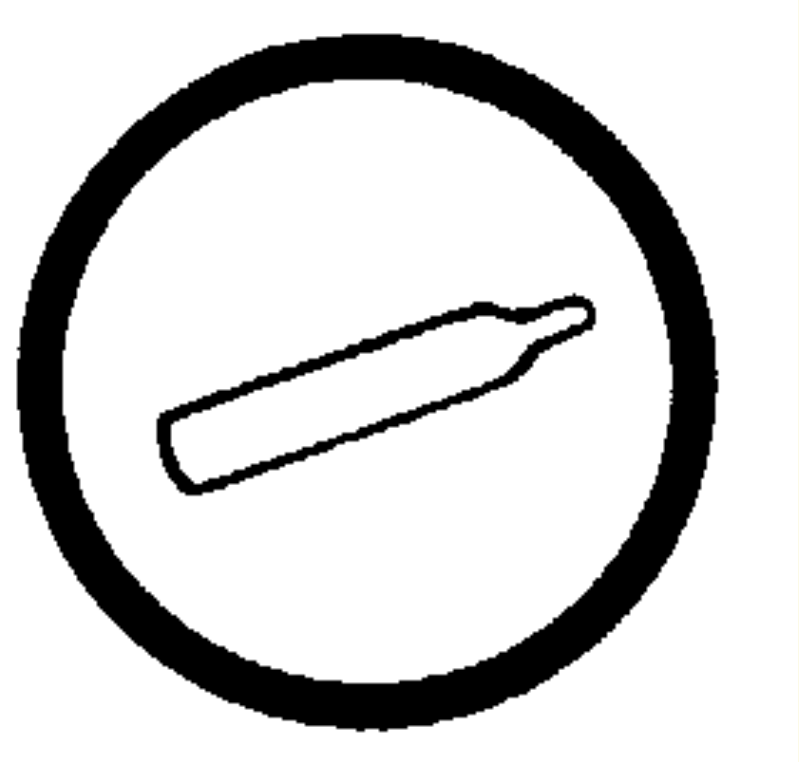
EXTINGUISHING MEDIA

SPECIAL FIRE FIGHTING PROCEDURES

UNUSUAL FIRE AND EXPLOSION HAZARDS

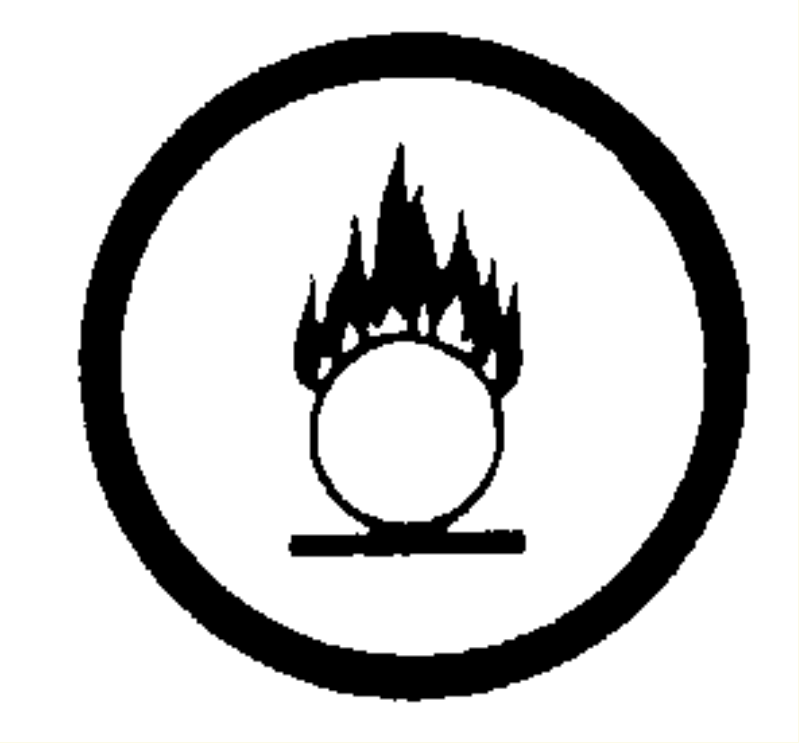
WHMIS SYMBOLS

- ✓ Class A
- ✓ Compressed G
- ✓ ie) acetylene cylinder (welding)



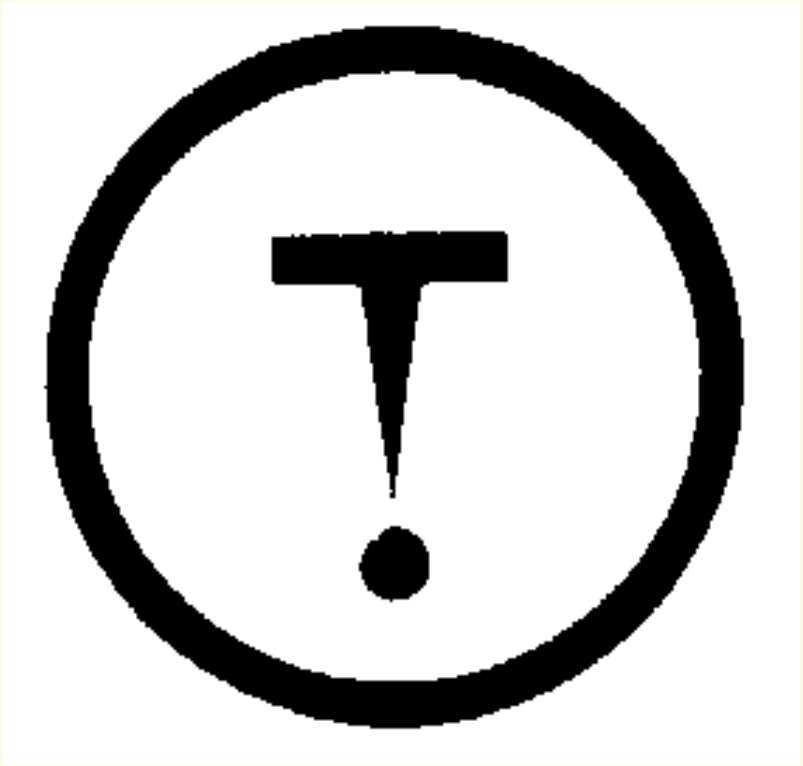
- ✓Class B
- ✓Flammable & Combustible Material
- ✓ie) methane

- ✓Class C
- ✓Oxidizing Material
- ✓ie) Acid

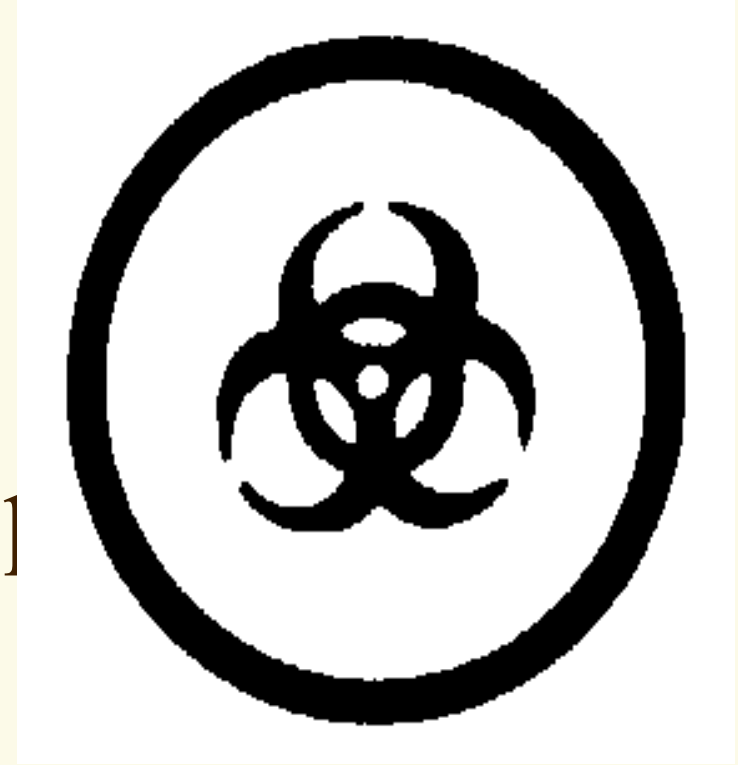


- ✓Class D1
- ✓Materials causing immediate & serious toxic effects
- ✓ie)Acids & Bases

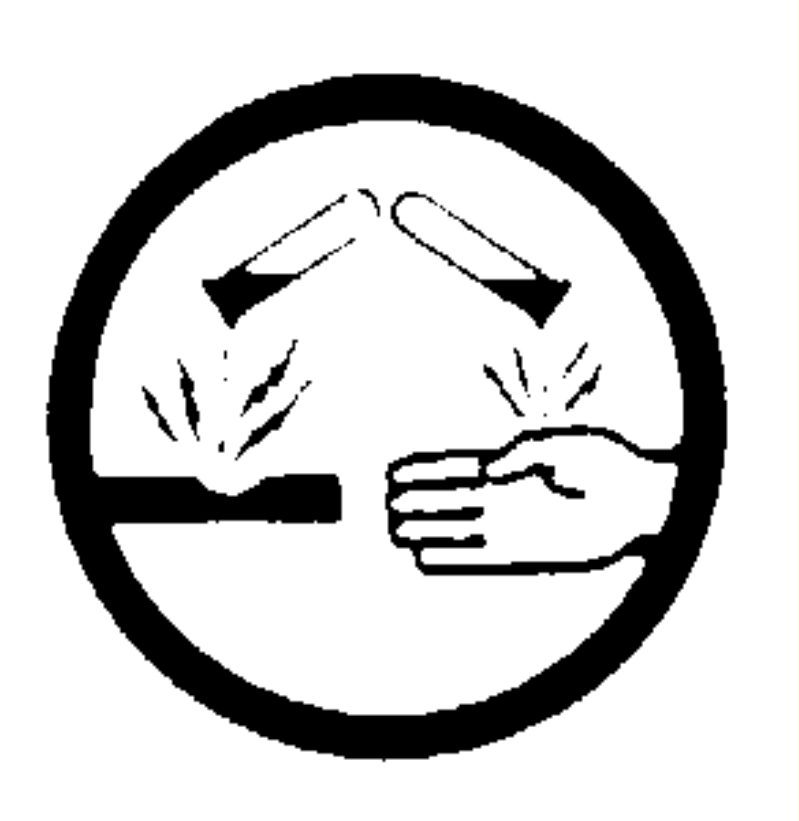
- ✓Class D2
- ✓Materials causing other toxic effects.
- ✓ie) Heavy metals (Pb, Hg)



- ✓ Class D3
- ✓ Biohazardous Infectious material
- ✓ viruses, biological weapons

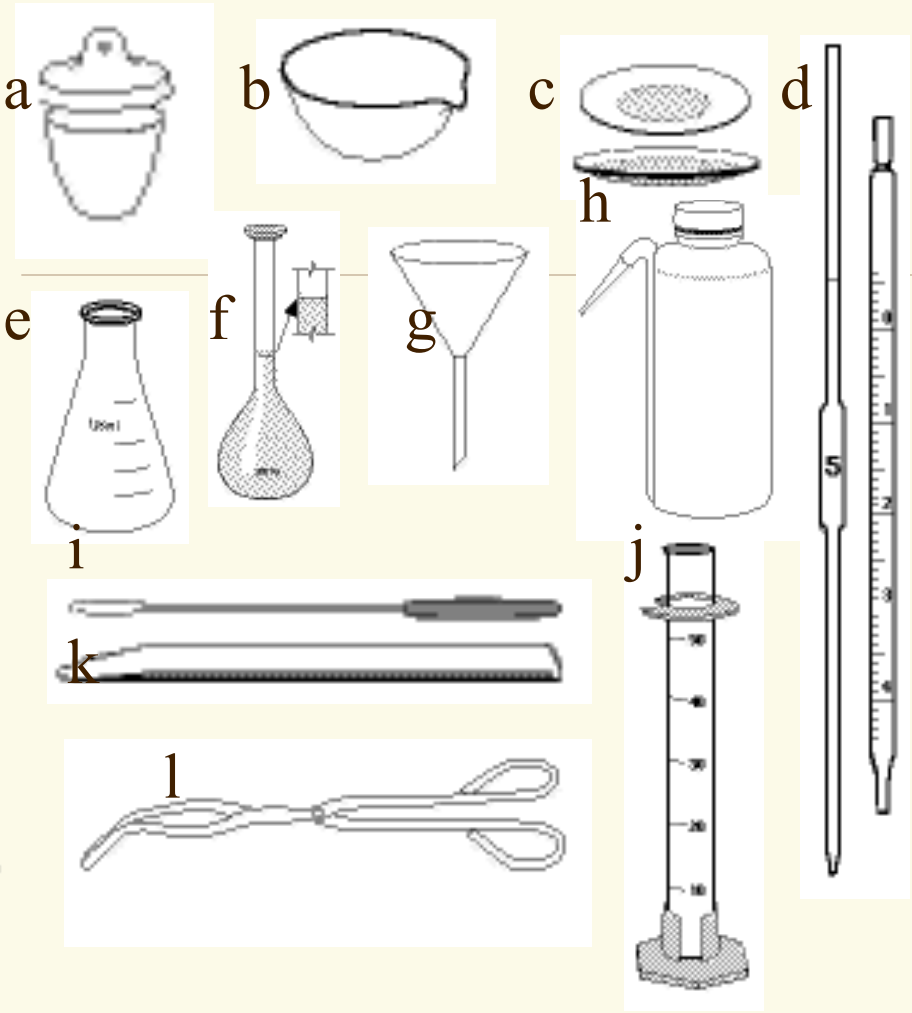


- ✓ Class E
- ✓ Corrosive Material
- ✓ ie) Acids & Bases



- ✓ Class F
- ✓ Dangerously Reactive Material
- ✓ ie) sodium

Lab Equipment



a. crucible

b. evaporating dish

c. Watch glass

d. Volumetric pipet & graduated pipet

e. erlenmeyer flask

f. volumetric flask

g. funnel

h. wash bottle

i. Stirring rod with rubber policeman

j. graduated cylinder

k. scoopula

l. tongs