

### Lab Rules

No chemicals are handled or experiments carried out except when teacher is present.  
 Chemical weighing at station 1 only.  
 Experimenting happens at lab tables only  
 Everyone participates in clean up.  
 Use lab safety guidelines at all times  
 Wear lab safety equipment when at a table with chemicals

### Lab Rule Consequences

- 1: warning, asked to leave for short period
- 2: asked to leave for whole period, call home
- 3: lose lab privileges

### Clean Up Tasks

Tables sprayed and wiped down  
 Counters sprayed and wiped down  
 All glassware is washed with soap, rinsed, and put on dry rack  
 Excess reactant bottled and labeled  
 All goggles put away neatly  
 Chairs up  
 Sweep the floor

### Behavior Rubric

Criteria	Grade Yourself	Give an example of what you did to earn this grade	Teacher Grade
Student arrives to class on time	_____ / 3 pts		
Student works productively on assignment for the entire block	_____ / 4 pts		
Student helps other; works cooperatively	_____ / 3 pts		

Lab Experiment Worksheet

NAME \_\_\_\_\_ DATE \_\_\_\_\_ GRADE \_\_\_\_\_

**Directions:** Fill out all information in complete sentences. Complete all exercises below. Successful completion of this lab sheet allows you to experiment with teacher permission.

**TQ :** \_\_\_\_\_ ?

The **IV** \_\_\_\_\_ will be measured using \_\_\_\_\_ .

The **DV** \_\_\_\_\_ will be measured using \_\_\_\_\_ .

Math Relationship / Connection between IV and DV is \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_ .

**Hypothesis**

\_\_\_\_\_  
\_\_\_\_\_ .

**Materials**

- Chemical #1 \_\_\_\_\_ amount \_\_\_\_\_ in \_\_\_\_\_ mL of water.
- Chemical #2 \_\_\_\_\_ amount \_\_\_\_\_ in \_\_\_\_\_ mL of water.
- Safety materials \_\_\_\_\_ , \_\_\_\_\_ , and \_\_\_\_\_ .
- Measurement equipment required \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_ , and \_\_\_\_\_ .

**Schematic Diagram :** Draw a sketch of your set up with at least 5 materials listed.

### Electrolysis Experiments Only

1. What is the expected volume of gas produced from 1.5 volts of electricity over 3 minutes?

- Write the balanced chemical equation for your reaction :
- 
- Use the physics book to find an equation that relates voltage, current, and resistance.
- 
- Given the voltage and resistance, find the current.
- 
- Use Faraday's law of electrolysis to find the number of moles produced.

2. If the current during this time was 0.3 Amps what was the power usage? How many Joules of energy were used? How many joules per mole were required to decompose H<sub>2</sub>O?

- Use physics book to find Electrical Power equation, write equation below.
- 
- Use physics book to find How does Watts relate to Joules and time in seconds?
- 
- Use physics or chemistry book to find the ideal gas equation.

1. If the volume of gas produced was 30 mL of H<sub>2</sub>O can you use ideal gas equation to find the number of moles at standard temperature and pressure.

### **Solar Cell Experiments Only**

1. What is pigment? What gives blackberries their pigment?
2. Do other fruits have this type of pigment?
3. Use the graph below to answer the question : If a leaf is green, which of the sun's wavelengths (colors) does it reflect? Which does it absorb? Explain how you know.
4. What is radiant energy? radiant flux? Irradiance? What is a photon?
5. Find the (photon) energy equation that uses Planck's constant, the speed of light, and wavelength in a physics book or hyperphysics web site.
6. Calculate the energy emitted by red light using the (photon) energy equation.
7.  $1 \text{ eV} = 1.6 \times 10^{-19} \text{ J}$  verify this conversion using a reliable resource.
8. Use physics book to find power equation and units
9. How much power is in red light (using #6, #7 and #8) if a stream of red photons is absorbed over 60 seconds?

**Chemical Measurements**

- Chemical #1 \_\_\_\_\_

Molarity	Total Atomic Mass	Total Mass	Amount of water to add
ex. 1 M NaOH	33.69 g/mol	33.69 g	1000 mL

- Molarity is also known as \_\_\_\_\_ per liter of water
- A liter of water is \_\_\_\_\_ mL.
- The atomic mass of Na is \_\_\_\_\_ , I know this because.
- The units of atomic mass are \_\_\_\_\_ .
- If you want to use 1M NaOH with only 40 mL of water how many grams of NaOH would you use? \_\_\_\_\_ . (Hint: ratio of mass to volume is constant. )

$$\frac{33.96g}{1000mL} = \frac{?g}{40mL}$$

Molarity	Total Atomic Mass	Total Mass	Amount of water to add
ex. 1 M NaOH	33.69 g/mol	_____ g	40 mL
			40 mL
			40 mL
			40 mL
			40 mL

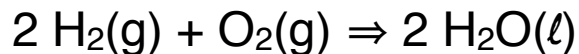
Displacement Reactions ONLY

**Directions:** Copy each scenario and answer the questions below using complete sentences in your notebook. Show all work and equations.

[ 2 slices of *bread* + 1 slice of *cheese* = 1 *cheese sandwich* ]

Scenario 1: Your cabinet has 25 slices of bread and 11 slices of cheese.

- How many sandwiches can you make?
- What is left over is called **excess reagent**. What are the excess reagents (after you make the sandwiches)? Explain.
- The **limiting reactant** is what you will need more of in order to make the most products. Which is the limiting reactant? How do you know?



Scenario 2: You put 1 mol of hydrogen gas or  $\text{H}_2$  and 1 mol of oxygen gas or  $\text{O}_2$  in a reaction vessel. ( Hint: the coefficient is the number of moles, for example  $2 \text{O}_2$  is 2 moles of oxygen gas. )

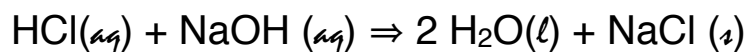
- How much water or  $\text{H}_2\text{O}$  can you make?
- What are the **excess reagents** ? Explain.
- Which is the **limiting reactant**? How do you know?

***In your notebook:*** For your testable question

- (1) write the balanced equation of your reaction.
- (2) Convert the grams of the metal either Zn or Al to moles using the molar mass.
- (3) Calculate the amount of limiting reactant and excess reagent.

Acid Base Reactions ONLY

**Directions:** Copy each example and steps in your notebook. Solve the practice problems below show all work and equations.



Example Problem: You put 25mL of 0.5M HCl and 30mL of 1.0M NaOH in a reaction vessel. Did you add enough acid to neutralized the base (pH = 7)? What is the pH of the product?

Step 1 : Find the new total volume of the products

$$\text{Step 1: } 30 \text{ mL NaOH} + 25 \text{ mL HCl} \\ = \mathbf{55 \text{ mL}} \text{ of solution}$$

Step 2 : Find the new molarity of the acid and base

$$\text{Step 2:} \\ 0.5\text{M HCl} \times 25 \text{ mL HCl} \div 55 \text{ mL} \\ = \mathbf{.227 \text{ mol/L}} \text{ or } \mathbf{.227 \text{ M}} \text{ HCl (acid)}$$

$$1.0\text{M NaOH} \times 30 \text{ mL NaOH} \div 55 \text{ mL} \\ = \mathbf{.545 \text{ mol/L}} \text{ or } \mathbf{.545 \text{ M}} \text{ NaOH (base)}$$

Step 3 : Find the pH. Compare it to neutral pH.

- Step 3:
- If base > acid then x = pOH  
then find pH, where pH = 14 - pOH
  - If acid > base then x = pH

$$x = -\log(\text{abs}(\text{base} - \text{acid})) \\ x = -\log(\text{abs}(0.545 - 0.227)) = 0.497 \\ \text{since base} > \text{acid } x = \text{pOH} \\ \text{then find pH} = 14 - (0.496) = 13.5$$

Practice Problem 1: You put 250mL of 0.5 M HCl and 450mL of 0.3 M NaOH in a reaction vessel. Did you add enough acid to neutralized the base (pH = 7)? What is the pH of the product? Add some amount of acid a recalculate the pH. Describe the affect.

Practice Problem 2: You put 40mL of 0.2 M HCl and 25mL of 0.3 M NaOH in a reaction vessel. Did you add enough base to neutralized the acid (pH = 7)? What is the pH of the product? Add some amount of base a recalculate the pH. Describe the affect.