

## AR CHEMISTRY LAB: Properties of Acids and Bases

**Purpose:** To observe the properties of acids and bases

**Materials:**

Spot Plate	Test Tube Holder	2-Test Tubes	2-100 mL Beakers
0.10 M HCl	6.0 M HCl	0.10 M NaOH	6.0 M NaOH
Phenolphthalein	Methyl Orange	Universal Indicator	Bromothymol Blue
Red Litmus Paper	Blue Litmus Paper	Universal pH Paper	

### Procedure:

#### A. Properties of Acids (NEVER TASTE CHEMICALS OR FOOD SAMPLES IN THE LAB!!!)

##### 1. Reaction of metals with acids releasing hydrogen gas

- Obtain a small strip of magnesium ribbon from your instructor
- Carefully place 1 cm of 6.0 M HCl into a clean test tube.
- Drop your magnesium strip into the tube holding the HCl. Immediately collect the gas in a second test tube held upside down above the reaction test tube.
- Set the gas collection test tube upside down on the table. Place the HCl test tube in the rack and make sure the rack / tube is at least 1.0 meter from the gas collection tube in the next step.
- Light a wooden splint and while keeping the gas collection upside down, raise the tube above the table, arms length away, and place the flame into the mouth of the tube.
- Rinse the excess acid into the waste jar!!!!



##### 2. Acids change the colors of indicators

- Place 5 drops of your 0.10 M HCl into 4 clean wells on your spot plate. Place one drop of an indicator solution into 1 of the wells (eg. Phenolphthalein in well #1, Bromothymol Blue into well # 2, etc.) Record your observations in the table below.

##### 3. Acids Neutralize Bases (and Bases Neutralize Acids)

Add drops of 0.10 M NaOH to the wells until the indicators change color. Not all indicators change color when acidic solutions become basic solutions (some change color when a concentrated acid becomes dilute), but for this lab we will “assume” that a color change indicates neutralization [We will investigate indicator color changes at non-neutralization in the next lab]

##### 4. Acids taste SOUR: Think Lemons and Limes---DO NOT TASTE IN THE LAB

Table 1: Colors of Indicators in Acidic and Basic Solutions

	Phenolphthalein	Methyl Orange	Bromothymol Blue	Universal Indicator
Color in Acid (A1-2)				
Color in Base (B1-2)				

## **B. Properties of Bases (NEVER TASTE CHEMICALS OR FOOD SAMPLES IN THE LAB!!!)**

### **1. Reaction of $\text{Mg}^{+2}$ with bases forming an insoluble precipitate**

- Place 50 mL of tap water into a clean 100 mL beaker
- Add one small scoop of Epsom Salt ( $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ ) into the beaker and stir with a stirring rod to dissolve the sample.
- Add several drops of 6.0 M NaOH into the beaker. The precipitate that forms is the insoluble  $\text{Mg}(\text{OH})_2$
- Rinse the contents of the beaker down the sink with lots of water

### **2. Bases change the colors of indicators**

- Place 5 drops of your 0.10 M NaOH into 4 clean wells on your spot plate. Place one drop of an indicator solution into 1 of the wells (eg. Phenolphthalein in well #1, Bromothymol Blue into well # 2, etc.) Record your observations in the table on the other side.

### **3. Bases Neutralize Acids (and Acids Neutralize Bases)**

Add drops of 0.10 M HCl to the wells in #2 until the indicators change color. Not all indicators change color when acidic solutions become basic solutions (some change color when a concentrated acid becomes dilute), but for this lab we will “assume” that a color change indicates neutralization [We will investigate indicator color changes at non-neutralization in the next lab]

### **4. Bases taste BITTER and are SLIPPERY: Think Lemons and Limes---DO NOT TASTE SAMPLES IN THE LAB**

## **Questions:**

### **A. Properties of Acids**

- What are the 4 properties of acids demonstrated in this lab?
- Write the balanced chemical equation for the dissolving of HCl in water.
- Write the balanced chemical equation for the reaction between HCl and  $\text{Mg}^0$

### **B. Properties of Bases**

- What are the 4 properties of bases demonstrated in this lab?
- Write the balanced chemical equation for the dissolving of ionic  $\text{MgSO}_4$  in water.
- Write the balanced chemical equation for the dissolving of NaOH in water.