Name : _____ Date: _____

Lab 2 Investigating Acids and Bases

Purpose

To observe the reactions of acids and bases with acid-base indicators, and then determine whether each of the common household product is an acid or a base

Recall:

Indicator	Acid	Neutral	Base
1. Phenoplthalein	Colourless (Cloudy)	Colourless	Pink
2. Bromothymol blue	Yellow	Blue	Blue
3. Methyl orange	Red	Yellow	Yellow
4. Blue litmus paper	Red	Blue	Blue
5. Red litmus paper	Red	Red	Blue
6. pH paper	0 – below 7	7	Above 7 – 14

Safety Precaution

- Some of the acids and bases used in this investigation are corrosive.
- Any spills on the skin, in the eyes, or on clothing should be washed immediately with cold water.
- Report any spills to your teacher.

Materials / Apparatus

sodium hydroxide, NaOH		sulfuric acid, H_2SO_4	distilled water
potassium hydroxide, KOH		hydrochloric acid, HCl	safety goggles
			spot plates
Indicators:	phenolphthalein	methyl orange	bromothymol blue
	red litmus paper	blue litmus paper	pH paper
Consumer Products:			
vinegar		baking soda	lemon juice

Procedure

1. Place **4 drops of distilled water** in each of **5 clean spots** in a spot plate.
2. Spot 1:
    - **Touch** the solution with your **index finger** and **rub your thumb** with the finger together to note the **feel** of the solution.
3. Spot 2:
    - Touch the solution with **a piece of red litmus paper** and record the colour change if any.
    - Touch the solution with **a piece of blue litmus paper** and record the colour change if any.
    - Touch the solution with **a piece of pH paper** and record the colour and the value by comparing the colour to the chart.
4. Spot 3: Add 2 drops of **phenolphthalein** to the solution and record your observations.
5. Spot 4: Add 2 drops of **bromothymol blue** to the solution and record your observations.
6. Spot 5: Add 2 drops of **methyl orange** to the solution and record your observations.
7. Repeat steps 1 to 6 using the acids, bases, and consumer products instead of distilled water.

Observations

	Spot 1	Spot 2			Spot 3	Spot 4	Spot 5	RESULTS
	Touch (gritty/ slippery/ wet)	**Red Litmus** (Colour)	**Blue Litmus** (Colour)	**pH Paper** (pH value)	**Phenol-Phthalein** (Colour)	**Bromothymol blue** (Colour)	**Methyl Orange** (Colour)	**Acid, base OR neutral?**
Distilled H_2O								
HCl								
H_2SO_4								
NaOH								
KOH								
vinegar								
lemon juice								
baking soda								

Discussion Questions

1. Observe the **chemical formula** for all the **acids**. What **ion(s)** is/are **common** and give **an acid** its **chemical properties**?

2. Observe the **chemical formula** for all the **bases**. What **ion(s)** is/are **common** and give a **base** its **chemical properties**?

3. Name **1 advantage** that **litmus paper** has over **liquid indicators,** such as bromothymol blue or phenolphthalein.

4. **Classify** each of the **consumer products** as an **acid** or **base**. (circle one correct answer)

   Vinegar: acid OR base

   Lemon juice: acid OR base

   Baking soda: acid OR base

   How do you know?

5. Which substance **did not change** the colour of both the blue and red litmus papers? If so, what is the substance's pH?

6. Which **pH indicator** gives you **more accurate (specific)** pH of substance?

7. If **red litmus paper turns blue** when placed in unknown chemical A. Chemical A is a/an **(acid, base or neutral)** solution. **Underline** the correct answer(s).

8. If **blue litmus paper stays blue** when placed in unknown chemical B. Chemical B is a/an **(acid, base or neutral)** solution. **Underline** the correct answer(s).

9. **Phenolphthalein turns pink** and **blue litmus paper stays blue** when placed in chemical B. Chemical B is a/an **(acid, base or neutral)** solution. **Underline** the correct answer(s).

10. If **phenolphthalein stays clear/cloudy** when placed in unknown chemical C. Chemical C is a/an **(acid, base or neutral)** solution. **Underline** the correct answer(s).

11. If **bromothymol blue turns yellow** when placed in unknown chemical D. Chemical D is a/an **(acid, base or neutral)** solution. **Underline** the correct answer(s).

12. If **methyl orange turns red** when placed in unknown chemical E. Chemical E is a/an **(acid, base or neutral)** solution. **Underline** the correct answer(s).