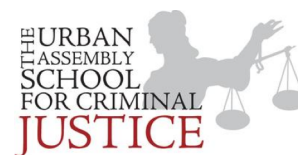


Name: _____ Date: _____

Chemistry ~ Ms. Hart Class: _____ Anions or Cations



Lab #23: Acid and Base Lab!

SAFETY: Strong acids and bases are toxic and strong skin irritants. Goggles, gloves, and aprons should be worn at all times. Wash your hands thoroughly before exiting the lab. Try not to touch the solutions with your hands. Use only the droppers and squeeze bottles on top of your trays.

Purpose: Measure the pH of known acids and bases.

Procedure:

1. Place ONE DROP of vinegar in the first spaces 1-3.
2. Place ONE DROP of sodium hydroxide in spaces 4-6.
3. Place ONE DROP of water in spaces 7-9.
4. On top of the drop of vinegar in space 1, place ONE DROP of bromothymol (indicator). Record your observation in your data table.
5. On top of the drop of vinegar in space 2, place ONE DROP of phenolphthalein. Record your observation in your data table.
6. Dip the pH paper (litmus paper) in the drop in space 3. Record your observation in your data table.
7. Repeat this with sodium hydroxide in spaces 4-6 and water in spaces 7-9.

pH paper Key:

red = 1 or 2
orange = 3-5
yellow = 6-8
green = 9-11
brown = 12-14

Bromothymol Blue

pH below 7 = YELLOW color
pH above 7 = BLUE color

Phenolphthalein

pH below 8 = colorless pH above eight = pink

Compound	Bromothymol	Phenolphthalein	Litmus Paper	pH	Acid, base, neutral
Vinegar					
NaOH					
Water					

Additional observations: _____

ANALYSIS: Use what you have learned about acid-base indicators and your reference sheets to answer the questions below.

- 1) Which pH indicates a basic solution?
 1. 1
 2. 5
 3. 7
 4. 12
- 2) What color is phenolphthalein in a basic solution?
 1. blue
 2. pink
 3. yellow
 4. colorless
- 3) Which statement correctly describes a solution with a pH of 9?
 1. It has a higher concentration of H_3O^+ than OH^- and causes litmus to turn blue.
 2. It has a higher concentration of OH^- than H_3O^+ and causes litmus to turn blue.
 3. It has a higher concentration of H_3O^+ than OH^- and causes methyl orange to turn yellow.
 4. It has a higher concentration of OH^- than H_3O^+ and causes methyl orange to turn red.
- 4) According to Reference Table M, what is the color of the indicator methyl orange in a solution that has a pH of 2?
 1. blue
 2. yellow
 3. orange
 4. red
- 5) Which equation represents a neutralization reaction?
 1. $\text{Na}_2\text{CO}_3 + \text{CaCl}_2 \rightarrow 2 \text{NaCl} + \text{CaCO}_3$
 2. $\text{Ni}(\text{NO}_3)_2 + \text{H}_2\text{S} \rightarrow \text{NiS} + 2 \text{HNO}_3$
 3. $\text{NaCl} + \text{AgNO}_3 \rightarrow \text{AgCl} + \text{NaNO}_3$
 4. $\text{H}_2\text{SO}_4 + \text{Mg}(\text{OH})_2 \rightarrow \text{MgSO}_4 + 2 \text{H}_2\text{O}$
- 6) When phenolphthalein indicator is added to a colorless solution with a pH of 10, a student observes and concludes that the tested solution
 1. remains colorless and is basic
 2. remains colorless and is acidic
 3. turns pink and is basic
 4. turns pink and is acidic
- 7) A student dissolves a substance in water, tests the resulting solution, and observes that red litmus paper turns blue. Based on this result, the solution is
 1. organic
 2. inorganic
 3. basic
 4. acidic
- 8) Given the reaction: $\text{KOH} + \text{HNO}_3 \rightarrow \text{KNO}_3 + \text{H}_2\text{O}$
Which process is taking place?
 1. neutralization
 2. decomposition
 3. single-replacement
 4. addition
- 9) A student was studying the pH differences in samples from two Adirondack streams. The student measured a pH of 4 in stream A and a pH of 6 in stream B.

What is the color of bromthymol blue in the sample from stream A?

- 10) The only positive ion found in an aqueous solution of sulfuric acid is the
 1. hydroxide ion
 2. hydronium ion
 3. sulfite ion
 4. sulfate ion
- 11) When $\text{HCl}(\text{aq})$ is **exactly neutralized** by $\text{NaOH}(\text{aq})$, the hydrogen ion concentration in the resulting mixture is
 1. always less than the concentration of the hydroxide ions
 2. always greater than the concentration of the hydroxide ions
 3. always equal to the concentration of the hydroxide ions
 4. sometimes greater and sometimes less than the concentration of the hydroxide ions
- 12) A solution with a pH of 11 is first tested with phenolphthalein and then with litmus. What is the color of each indicator in this solution?
 1. Phenolphthalein is colorless and litmus is blue.
 2. Phenolphthalein is colorless and litmus is red.
 3. Phenolphthalein is pink and litmus is blue.
 4. Phenolphthalein is pink and litmus is red.
- 13) Which reaction represents the process of neutralization?
 1. $\text{Mg}(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow \text{MgCl}_2(\text{aq}) + \text{H}_2(\text{g})$
 2. $\text{HCl}(\text{aq}) + \text{KOH}(\text{aq}) \rightarrow \text{KCl}(\text{aq}) + \text{H}_2\text{O}(\text{l})$
 3. $\text{Pb}(\text{NO}_3)_2(\text{aq}) + \text{CaCl}_2(\text{aq}) \rightarrow \text{Ca}(\text{NO}_3)_2(\text{aq}) + \text{PbCl}_2(\text{s})$
 4. $2\text{KClO}_3(\text{s}) \rightarrow 2\text{KCl}(\text{s}) + 3\text{O}_2(\text{g})$
- 14) A student was given four unknown solutions. Each solution was checked for conductivity and tested with phenolphthalein. The results are shown in the data table below.

Solution	Conductivity	Color with Phenolphthalein
A	Good	Colorless
B	Poor	Colorless
C	Good	Pink
D	Poor	Pink

Based on the data table, which unknown solution could be 0.1 M NaOH?

1. A
 2. B
 3. C
 4. D
- 15) Which compound could serve as a reactant in a neutralization reaction?
1. NaCl
 2. KOH
 3. CH_3OH
 4. CH_3CHO

