

Data and Calculations for Experiment 9

A. Electrolytes and Instructor Demo

Place an "X" on the label that properly describes each compound below:

	Non-Electrolyte	Strong Electrolyte	Weak Electrolyte
1. Tap water			
2. Distilled water			
3. Sugar solution			
4. NaCl solution			
5a. Pure (glacial) acetic acid			
5b. Diluted acetic acid			
5c. Twice diluted acetic acid			
6a. 1 M acetic acid			
6b. 1 M HCl			
6c. 1 M NH ₄ OH			
6d. 1 M NaOH			
7a. NaNO ₃			
7b. NaBr			
7c. Ni(NO ₃) ₂			
7d. CuSO ₄			
7e. NH ₄ Cl			

1. What reaction occurs when barium hydroxide and sulfuric acid are mixed?
2. Explain why the light becomes dimmer as two strong electrolytes are mixed with each other.
3. Why does the light come back on after more of the electrolyte is added?
4. What happens to the glacial acetic acid as it is diluted? How does this explain the changes in light intensity?

B. Properties of Acids

1. Reactions of Acids with Metals

- a) Which acids reacted with the magnesium to produce H_2 gas?
- b) Represent the reaction between the metal and ONE acid that occurred with an equation.

2. Measurement of pH and Acidity

- a) Acids turned the red litmus paper _____.
- b) Acids turned the blue litmus paper _____.
- c) What is the color of phenolphthalein in acidic solution? _____
- d) What is the pH of the 0.1 M solution? _____
What is the pH of the 0.01 M solution _____
What is the pH of the 0.001 M solution? _____
- e) Which solution has the greatest concentration of H^+ ?
- f) Calculate the H^+ concentration of a $pH = 4.6$ solution. Write the answer in scientific notation.

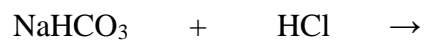
3. Reactions of Acids with Carbonates and Bicarbonates

- a) What is the name and formula of the gas formed in this reaction?
- b) What happened to the burning stick when it was placed in the beaker?

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c) Write out the products of the reactions in a balanced equation:



4. Neutralizing Acids with Base: Using Indicators

a) Write a balanced equation for the reaction of HCl and NaOH.

b) What happened when the acid was all neutralized?

5. Reaction of a Non-Metal Oxide and Water

a) Write a balanced equation for the reaction of sulfur and oxygen.

b) What happens when the product of the above reaction reacts with water? Write a balanced equation that represents this reaction.

c) Write a balanced equation for the reaction of carbon dioxide and water.

d) How do you know that the product in the reaction above is acidic?

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C. Properties of Bases

1. Properties of ammonium and sodium hydroxides

- a) What did the sodium hydroxide feel like? _____
- b) What did the ammonium hydroxide feel like? _____
- c) Bases turned the red litmus paper _____.
- d) Bases turned the blue litmus paper _____.
- e) What is the pH of the ammonium hydroxide solution? _____
- f) What is the pH of the sodium hydroxide solution? _____
- g) Calculate the concentration of H^+ in the more basic solution _____

2. The Reaction of Metal Oxides and Water

- a) What is the color of phenolphthalein with CaO ? _____
What is the color of phenolphthalein with MgO ? _____
What is the color of phenolphthalein with $Ca(OH)_2$? _____

- b) Write the balanced equations for the following reactions:



- c) Marble is calcium carbonate ($CaCO_3$). Write a balanced equation for the reaction that occurs when you heat the marble chip.

- d) Write a balanced equation for the reaction that occurs when you put the heated marble chip in water.