Chem. 105 Experiment 8 Stamp:
Name:
Partners' name(s):

Laboratory 8: Acids and Bases

Lecture Notes:

1. What is an electrolyte?

Demo: Electrolyte solutions
Observations:

Table 1:

Solution	Is it a strong, weak, or nonconducting solution?

How substances dissolve in water (diagrams):

Ionic compounds (salts):

Molecular compounds:

Acids:

Bases:

Demo: Electric pickle
Observations:

2. The properties of acids and bases:
   Demo: Reaction between an acid and a metal
   Observations:

   Demo: Reaction of acids and bases with litmus
   Observations:

   Demo: Reaction between and acid and a base in universal indicator
   Observations:

   Demo: Alka-Seltzer in Universal Indicator
   Observations:

   Demo: A secret message
   Observations:

   Other properties of acids

3. What is acid rain?

4. What is concentration?

5. What is pH? What is an indicator?

6. How do you calculate the concentration of an unknown acid solution?

Purpose: To study the properties of acids. To measure the pH of several substances.

Procedure and Observations and Data: To be done in groups of two.

A. Measuring pH with Universal indicator (pH) paper

In your spot plate obtain a sample (half-fill the wells) of each of the solutions shown in the table below. Dip a small (1 cm) piece of Universal Indicator paper into each well. Record the color of the paper and match the color to the pH scale on the tube of paper.

B. Measuring pH with cabbage juice

Make sure there is no Universal Indicator paper in the solution wells. Obtain a piece of purple cabbage (one leaf) from the reagent bench. Break it up into small pieces and boil it in about 150 ml of de-ionized water in a 250 ml beaker. Add 15 drops of the cabbage juice extract to each of the wells of your spot plate. Make sure you add the same amount of extract to each well. Record the color of each solution.

Complete the table that compares the colors of each pH indicator at each pH

Table 2: Chemicals and their pH

Solution	Color of cabbage juice	Color of pH paper	pH

Make a table showing the color of cabbage juice at each pH. 1-14.

Table 3:

Cabbage Juice Color	pH	pH Indicator Paper Color
	1	
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
	11	
	12	
	13	
	14	

C. Finding the concentration of an acid solution (A simple titration)

- Obtain 10 ml of the standard base solution in a clean and dry beaker. Record the concentration of the NaOH base. Obtain 10 ml of the unknown acid solution in a clean and dry beaker.
- Add 20 drops of the acid and add one or two drops of the phenolphthalein indicator (on the shelf above your lab bench) to your clean evaporating dish. Add about 10 ml of de-ionized water. The solution should have no color yet.
- Add the base one drop at a time with the your partner's clean eye dropper until the solution turns a faint pink. Stir the solution. If the pink goes away, add more base, stirring each time. When the solution turns a faint, but persistent pink, you have reached the endpoint. Record the drops of base used.
- If your solution is a very dark pink, you added too much base. Add 3 drops of the acid and stir. Now add the base drop wise until you reach the endpoint.

Table 4:

Concentration of base	Drops of base	Drops of acid

Calculations

1. Balance the equation: $NaOH + HCl \rightarrow NaCl + H_2O$.
2. Find the concentration of HCl.

D. Acid rain activity

Questions and Answers:

1) Which substances had different pHs than you expected?

2) Why are acids and bases important?

3) Were the household cleaners basic or acidic or both?

4) What does pH mean to you now?

Conclusions and Reflections

- What are 2 questions you have about acids bases or solutions?

- If you were explaining acids and bases to your students, what question would you ask them to ascertain if they understand what you are talking about?