Introduction to Chemistry LAB

Fall 2022/2023

Lab Reports 6-10

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Lab 6

Experimental Procedure:

1. Perform test for chlorine
2. Perform test for sulfate
3. Perform test for nitrate
4. Perform test for carbonate

Apparatus used:

1. Centrifuge tube

2. Dropper

3. Litmus paper

4. Stirring rod

Results

Known solutions of Ions

a. Cl^{-1} test: Milky white solution
b. SO_4^{-2} test: Milky white solution
c. NO_3^{-1} test: Brown
d. CO_3^{-2} test: Bubbles

Unknown Solutions of Anions

e. Cl^{-1} test: P
f. SO_4^{-2} test: P
g. NO_3^{-1} test: P
h. CO_3^{-2} test: P

Post Lab Exercise

1. ANSWERS
   Anion: negative ion
   Aqueous solution: solution in which the solvent is water
   Centrifuge: device that uses centrifugal force to separate various components of a fluid.
   Precipitate: a solid formed by a change in a solution, often due to a chemical reaction or change in temperature that decreases solubility of a solid.
   Qualitative analysis: is the determination of non-numerical information about a chemical species or a reaction
2. We use distilled water because it does not contain impurities like dissolved ions
3. If the material is acidic, the blue litmus paper turns red. If the material is basic or alkaline, the red litmus paper turns blue.
4. Calcium, Magnesium, Sodium and Potassium

Lab 7

Experimental Procedure:

1. Rinse the inside of the burette with water
2. Rinse the burette with small amount of NaOH
3. Fill burette with 0.1m of NaOH
4. Do titration

Apparatus used:

1. Burette

2. Pipette

3. Indicator

4. Funnel

Results

Staring burette reading: 1mL
Ending burette reading: 12.4mL
End value of NaOH solution: 11.4 mL
Moles of NaOH equals: 0.0114 L x 0.1 = 11.4 x 10^{-4}
Moles of acetic acid: 5 x 10^{-3}
Molarity of acetic acid: 0.228

Post Lab Exercise

1. Acetic acid
2. 0.32 mL
3. Molarity (M) is the amount of a substance in a certain volume of solution
   60.052 g/mol
4. Sodium Chloride

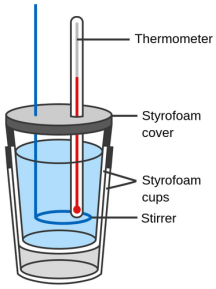
Lab 8

Experimental Procedure:

1. Use graduated cylinder to put water into styrofoam cup
2. Add solid sodium hydroxide until the balance reads 2g
3. Add solid NaOH to water
4. Calculate mass of water, solution and temperature change

Apparatus used:

1. Styrofoam cup calorimeter



2. Thermometer

3. Stirring rod

4. Burette

5. Beaker

Results

Data and Calculations for the head of neutralization

a. Volume of NaOH solution: 50mL
b. Molarity of NaOH solution: 0.5
c. Moles of NaOH reacted: 0.025mL
d. Mass of NaOH solution: 50g
e. Volume of HCl solution: 50 mL
f. Molarity of HCl solution: 0.5
g. Moles of HCl reacted: 0.025 mol
h. Mass of HCl solution: 50g
i. Total mass of mixed soln: 100g
j. Initial temperature of NaOH or HCl soln: 21.1 C
k. Final temperature (NaCl soln): 24.1 C
l. Temperature change: 3 C
m. Moles of water formed: 0.025 mol
n. Delta H2 of neutralization: 50.208 kg/moles
o. Heat of neutralization: 0.876 C

Post lab exercise

1. Sodium hydroxide (NaOH) is a base and hydrochloric acid (HCl) is an acid. Thus, when they react together, they undergo a neutralization reaction to form sodium chloride (NaCl) salt and water (H2O).
2. Specific heat, the quantity of heat required to raise the temperature of one gram of a substance by one Celsius degree.
3. Endothermic reactions are chemical reactions in which the reactants absorb heat energy from the surroundings to form products. An exothermic reaction is a reaction in which energy is released in the form of light or heat.
4. Do not touch or taste any unknown substance.
5. Sulfuric acid

Lab 9

Experimental Procedure:

1. Obtain Mg strip and calculate number of moles
2. Fill an 800 mL beaker with about 700 mL
3. Pour 10 mL of 6 M HCl into the buret.
4. Fold metal strip and place in a burette.
5. Turn burette over and put in beaker

Apparatus used:

1. Burette

2. Beaker

3. Magnesium Strip

Results

a. Molar mass of Mg: 24.3 g/mole
b. Moles of Mg reacted: 0.00915 moles
c. Moles of H_2 formed: 0.00915 moles
d. Temperature: 294.3K
e. Pressure of dry H_2: 0.975 atm

f. Volume of H_2 : 0.0445 L
g. The Gas constant R: 0.07

Post Lab Exercise

1. The airbags in vehicles work on the ideal gas law.
2. If you use the first value of R, which is 0.082057 L atm mol-1K-1, your unit for pressure must be atm, for volume must be liter, for temperature must be Kelvin.
3. There is a need to maintain a constant temperature in an experiment to measure an equilibrium constant.
4. Do not touch or taste any unknown substance.
   Use only a small quantity of chemicals to carry out experiments.

Lab 10

Experimental Procedure:

1. Add 20 drops of benzene to test tube
2. Heat slowly with Bunsen burner
3. Record boiling point when bubbles start appearing

Apparatus used:

1. Test tube

2. Capillary tube

3. Beaker

4. Thermometer

Results

Benzene:

Temperature at Boiling point = 80 C

Unknown:

Temperature at Boiling point = 55 C

Post Lab Exercises:

1. Benzene boiling point in Fahrenheit = 176.2°F
   Benzene boiling point in Kelvin = 353.2 K
2. Unknown boiling point in Fahrenheit = 131°F
   Unknown boiling point in Kelvin = 328.15 K
3. The boiling point of a liquid is the temperature at which its vapor pressure is equal to the pressure of the gas above it.
4. (°F − 32) × 5/9 = °C
5. At elevated altitudes, any cooking that involves boiling or steaming generally requires compensation for lower temperatures because the boiling point of water is lower at higher altitudes due to the decreased atmospheric pressure.