**Using Conductivity to Find an Equivalence Point**

**\*\*Use 0.005M sulfuric acid**

In this experiment, you will monitor conductivity during the reaction between sulfuric acid and barium hydroxide in order to determine the equivalence point. From this information, you can find the concentration of barium hydroxide knowing the concentration of sulfuric acid.

\*include in introduction a balanced equation, an explanation of electrolytes and why the conductivity changes over the time of the titration.

Prior to the experiment, it is very important for you to hypothesize about the conductivity of the solution at various stages during the reaction. Would you expect the conductivity reading to be high or low, and increasing or decreasing, in each of these situations:

1. When the conductivity probe is placed in barium hydroxide solution, prior to the addition of sulfuric acid
2. As sulfuric acid is slowly added, producing barium sulfate and water
3. When the moles of sulfuric acid added equal the moles of barium hydroxide originally present
4. As excess sulfuric acid is added beyond the equivalence point

Procedure:

1. Obtain and wear goggles.
2. Measure out approximately 60 ml of sulfuric acid solution into a 250 ml beaker. Record the precise molarity of the sulfuric acid. CAUTION: sulfuric acid is a strong acid and should be handled with care.
3. Obtain a 50 ml buret and rinse the buret with a few ml of sulfuric acid. Fill the buret a little above the o.00 ml mark and drain a small amount into a waste beaker so it fills the tip and leaves the sulfuric level at 0.00 ml mark.
4. Measure out 50.0 ml of barium hydroxide solution of unknown molarity using a 50 ml graduated cylinder and transfer it to a clean, dry 250 ml beaker. Then add 120 ml of distilled water to the beaker. CAUTION: barium hydroxide is toxic. Handle with care.
5. Add two drops of phenolphthalein indicator to the barium hydroxide solution.
6. Before adding sulfuric acid, place the conductivity probe in the barium hydroxide solution and click start. Once the value stabilizes, record the conductivity of the solution before any sulfuric acid is added.
7. You are now ready to begin the titration. Add 1.0 ml of 0.020 M sulfuric acid to the beaker. Mix the solution several times and allow the conductivity reading to stabilize. Record the volume of sulfuric acid added and the conductivity reading.
8. Continue adding 1.0 ml increments of sulfuric acid, each time entering the buret reading and the conductivity value, until the conductivity value drops below 100 μS/cm.
9. After the conductivity drops below 100 μS/cm, use 2 drop increments (~0.1 ml) until the minimum conductivity has been reached. This is the equivalence point. Once you have passed the equivalence point, continue using 2 drop increments until the conductivity is greater that 100 μs/cm again.
10. Make a graph of conductivity vs volume of sulfuric acid added and determine the volume of sulfuric acid needed to reach the equivalence point.
11. Calculate the moles of sulfuric acid needed to reach the equivalence point.
12. Use the stoichiometry of the precipitation reactions to determine the moles of barium hydroxide in the original solution.
13. Calculate the molarity of the barium hydroxide solution and determine the percent error.

Data:

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| --- | --- |
| Molarity of sulfuric acid | M |
| Volume of sulfuric acid | ml = L |
| Volume of barium hydroxide | ml = L |

|  |  |
| --- | --- |
| Moles of sulfuric acid | mol |
| Moles barium hydroxide | mol |
| Molarity barium hydroxide | M |