# AP Chemistry: Examining Concentration & Conductivity

# Determining the Concentration of an Unknown Solution Through Conductivity

In this experiment, you will examine and classify substances based on their behavior in solution.

**Part I: Observing Solutions**

Combine each of the substance listed below with water in small test tubes. You may need to stopper and agitate them to see any change. Note any changes in appearance and temperature, as well as their solubility, in a data table of your own design. Be sure it is NEAT and ORGANIZED!

\*When you are done with each solution, place it in the back of the room in the appropriate beaker and test the conductivity using the light bulb conductivity apparatus. Record each solution’s conductivity (strong, weak, or non-electrolyte) in your data table. WARNING: The conductivity probe is plugged into an electrical socket. Do not touch the leads of the probe with your body; you could get shocked!

|  |  |
| --- | --- |
| Solids | Liquids |
| * NaCl
* Sugar
* Ammonium chloride
* Wax
* Sodium hydroxide
 | * Acetic acid
* HCl
* Phosphoric acid
* Ethanol
* Glycerine
* Mineral oil
* Gatorade
* Distilled water (test for conductivity only)
 |

**Questions**

1. Based on your observations of conductivity, what do the electrolytic compounds have in common; are they molecular, ionic, or molecular acids?
2. Write an equation for the dissociation of each of the electrolytes. Use “ **→** “ for strong electrolytes and “$↔$” for weak electrolytes.
	1. Based on your equations, summarize the behavior of electrolytes in relation to their dissociation.
3. Draw a picture of one of the strong electrolytes dissolving. Label each atom/ion and water.

**Part II: Concentration & Conductivity**

In this portion of the lab you will examine the effects of concentration on a solution’s conductivity.

1. Using the conductivity probe, test the conductance of the .100 M barium hydroxide and sulfuric acid solutions. Record these values and any observations of the solutions.
2. Fill a buret with the sulfuric acid solution. Record the initial volume.
3. Place about 25 mL of barium hydroxide into a 250 mL beaker. Lower the conductivity meter into the base and take a reading. This will be your first conductance reading.
4. Begin titrating the base with the acid. After each 1.00 mL of added acid, record the conductance from the Lab Quest. Titrate until all of the acid has been used.
5. Clean your buret and place upside down to dry. Dispose of the solution as directed by your teacher.

**Questions/Analysis**

1. Write and balance an equation for the reaction of the barium hydroxide and sulfuric acid. (overall and net ionic equations, please)
2. Graph the conductance data. Mark the equivalence point.
	1. What does the equivalence point mean in this titration?
3. Write equations for the ionization of each solution before the titration.
4. In the beakers below, draw in the IONS, FORMULA UNITs and/or MOLECULES present at each point of the titration indicated.

Before sulfuric acid is added

After the addition of 10 mL sulfuric acid

At the equivalence point

1. Explain the trend shown in your graph. Why did the conductance change? Explain in terms of what you know about the conductivity of solutions.
2. Using your balanced equation and the concentration of the base, calculate the concentration of the sulfuric acid solution.

Properties of Solutions: Grading Rubric

Part I (50 pts)

* Write an objective for the lab in your own words (5)
* Write your specific procedures of what you did to mix the chemical provided. (5)
* Data table with observations, solubility and conductivity. (25)
* Three questions written out and answered. (15)

Part II (50 pts)

* Measurements of initial conductance and observations. (5)
* Summarized procedures. (5)
* Table of conductance values (51 total) (15)
* Five questions written out and answered (along with drawings and graph of conductance data). (20)
* Summary of the lab results and conclusions. (At least 4 sentences) (5)