

Identifying Unknown Solutions

In this activity you will use a simulation of conductivity measurements and a simulation of a pH meter to identify solutions. The solutions you will observe: strong acids, strong bases, weak acids, weak bases and salts (neutral, acidic or basic).

Part I – The Conductivity Simulation

Choose a solution. Use the slider bar to adjust the volume in the beaker. Click the “connect” button to complete the circuit and observe the light bulb. Click the “disconnect” button to change solutions.

Observe the conductivity for the ACID solutions.

Is there a difference in conductivity between a weak acid and a strong acid?

(How bright was the bulb lit up between the two?)

If you vary the volume of solution, does the conductivity change?

Observe the conductivity for the BASE solutions.

Is there a difference in conductivity between a weak base and a strong base?

If you vary the volume of solution, does the conductivity change?

Observe the conductivity for the SALT solutions.

Is there a difference in conductivity between an acidic salt and a basic salt?

If you vary the volume of solution, does the conductivity change?

Part II – The pH Meter Simulation

Choose a solution. Use the slider bar or type in a number to select a concentration, in units of molarity. Note that if you type in 50.00 you can select "X 10⁻³" or "X 10⁻²". 50.00 X 10⁻² is 0.500 M. Use the slider bar or type in a volume. Click-on the pink "insert probes" button on the pH meter. The pH meter will read the pH and temperature of the solution. You will need to record the pH, concentration and volume of the solution. Click-on the blue "remove probes" button on the pH meter to remove the probes. Select a new concentration and volume to test the same solution, or click-on another solution to start taking new measurements. In order to make a pH measurement of a new concentration you have to remove the probe (just as you would in lab).

Compare the pH of 100.0 ml of **0.500 M** HCl (pH = _____) to the pH of 100.0 ml of **0.0500 M** HCl (pH = _____).

Does this seem right to you? (Check by doing your own calculations, you will have to know how to do this for your exam)

Compare the pH of 50.0 mL **0.0500 M** nitric acid, HNO₃ (aq) to the pH of 50.0 mL **0.0500 M** nitrous acid, HNO₂ (aq).

Does this seem right to you?

What if you had 150 mL of each solution?

Compare the pH of 50.0 mL **0.0500 M** NaOH (aq) to the pH of 50.0 mL **0.0500 M** NH₃ (aq).

Does this seem right to you?

Compare the pH of 75.0 mL **0.0500 M** NaCl (aq) to the pH of 75.0 mL **0.0500 M** ammonium nitrate, NH₄NO₃ (aq) and 75.0 mL **0.0500 M** sodium acetate, NaC₂H₃O₂ (aq).

Does this seem right to you?

Try a few more of the other acids, bases and salts before going on to part III.

Part III – The Unknowns

Each simulation has six unknowns for you to explore. Record your observations here.

Unknown	Observation of Conductivity
#1	
#2	
#3	
#4	
#5	
#6	

pH Measurements for solutions of varying concentrations

Unknown	.01 M	0.02 M	0.10 M	0.20 M
#1				
#2				
#3				
#4				
#5				
#6				

Based on the data you have collected, identify the six unknowns as either a strong acid, strong base, weak acid, weak base, acidic salt, or basic salt.

Unknown	Answer
#1	
#2	
#3	
#4	
#5	
#6	

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