

Electrolytes and Non-electrolytes

PRE-LAB DISCUSSION:

Substances that are capable of conducting an electric current in solution are known as electrolytes. Substances that do not conduct an electric current in solution are known as non-electrolytes. Among electrolytes, the ability to conduct varies greatly. Some substances are excellent conductors, while others conduct only slightly. Conductivity meters can be used to measure the ability of various solutions to conduct. However, quality conductivity meters are expensive. Your instructor has constructed some inexpensive conductivity testing devices using light emitting diodes (LED's) and a nine volt battery. Below you will find a relative scale of conductivity from 0 (non-conductor) to 4 (excellent conductor). You will use this scale in conjunction with your conductivity tester in order to quantify the conductivity of various solutions.

Conductivity Scale for Conductivity Measurements			
Scale	Red LED	Green LED	Conductivity
0	off	off	very low or none
1	dim	off	low
2	medium	off	medium
3	bright	dim	high
4	very bright	medium	very high

PURPOSE: To identify solutions as electrolytic and non-electrolytic, and to identify variations in conductivity among electrolytes.

PROCEDURE:

ALWAYS wear goggles when working in the laboratory!

1. Obtain a clean, dry well plate from your lab drawer. It is crucial that the wells be clean and dry – contamination could significantly alter your results.
2. Place samples of the solutions to be tested, in wells, away from one another. Be certain to place enough solution in the wells to make testing possible, but not so much as to overflow the well and contaminate other solutions. It is suggested that you place the spot plate on a piece of paper, and label the paper in order to distinguish one solution from another.
3. Obtain a conductivity tester, and connect the nine-volt battery to the snap connectors. **BE CAREFUL NOT TO TOUCH THE EXPOSED WIRE OF THE ELECTRODES THAT ARE USED FOR TESTING.**
4. To confirm that the battery and device are working properly, briefly touch the two electrodes to one another, while keeping your fingers well away from the exposed copper ends. If the LED's fail to light up, ask your instructor to check the device for you. **DO NOT TRY TO TAKE THE DEVICE APART ON YOUR OWN.** Once you are certain that the device is working properly, proceed to the next step.
5. Test the first solution by placing both electrodes in the well, but **DO NOT ALLOW THE ELECTRODES TO TOUCH ONE ANOTHER!** Record the response of the LED's in your Data section.
6. Rinse the electrodes with distilled water between each test to avoid contamination of the wells that remain to be tested.
7. Continue testing each solution, washing the electrodes between tests and always being careful not to allow the electrodes to touch each other when immersed in the solution that is being tested.
8. When all of the tests are complete, thoroughly rinse the spot plate in the sink, and rinse a second time with distilled water.
9. Disconnect the nine volt battery from the conductivity tester. Return the conductivity tester to the counter where you found it.

RESULTS

For each solution tested, record the intensity of light produced from each LED. Use the following descriptive terms as used on the previous page:

OFF, DIM, MEDIUM, BRIGHT, VERY BRIGHT

NOTE: *Your instructor may provide solutions other than the ones listed. Be certain to check the actual solutions before filling out the left-hand column on your lab paper.*

Substance Tested	Red LED	Green LED	Conductivity
Pure water			
Tap Water			
Sodium Chloride solution			
Ethanol in pure water			
Sugar in pure water			
0.2 Molar hydrochloric acid solution			
Soda			
Gatorade			