Conductivity of solutions

Purpose: To investigate the ability of different solutions to conduct electricity.

Procedure:

The classroom lights will be dimmed so that you can read the conductivity meter properly.

1. Get a conductivity tester, a 9-volt battery, a piece of paper towel, and a plastic spot plate.
2. Rinse and dry the spot plate. Go to one of the numbered lab stations.
3. Connect the battery to the conductivity tester. Touch the "electrodes" of the meter to a solid metal object (such as a tap). The light on the meter will flash if the meter and battery are working properly.
4. Each lab station has a number. These numbers correspond to the numbers on your spot plate. Place five drops of solution into the correctly numbered well.
5. Place the electrodes of the conductivity meter into the solution. Leave the electrodes in the solution for only a few seconds (to reduce corrosion). Record your reading in the chart below:

Flashing = strong, Glowing = weak, No response = non-conductive

6. Rinse the electrodes with tap water and wipe dry. Move to the next station.
7. Repeat steps 4-6 until you have tested all of the solutions.
8. Rinse and dry the electrodes. Disconnect the battery. Rinse the spot plate with tap water (all solutions go down the drain). Dry the spot plate. Clean the lab station that you were at last. Return all equipment.
9. The conductivity of pure (17.4 M) $HC_2H_3O_2$ will be demonstrated. Record this in the last row of the chart.

Observations:

Well # (lab station)	Solution	[ ]	Conductivity (strong, weak, or non-conductive)	Well # (lab station)	Solution	[ ]	Conductivity (strong, weak, or non-conductive)
1	Distilled water	-		7	HCl	5 M	
2	Tap water	-		8	HCl	1 M	
3	NaCl	5 M		9	$HC_2H_3O_2$	5 M	
4	$CuSO_4$	5 M		10	$HC_2H_3O_2$	1 M	
5	Sugar ($C_6H_{12}O_6$)	5 M		11	NaOH	5 M	
6	Alcohol (CH_3OH)	5 M		12	NaOH	1 M	

Give the name for each compound

$HC_2H_3O_2(aq)$ = _____ HCl(aq) = _____

NaOH(aq) = _____ $CuSO_4(aq)$ = _____

Questions (read 8.1 on pages 362 – 366. Refer also to the glossary):

1. Define electrolyte. Which types of compounds conduct electricity a) as liquids, b) when aqueous?
2. Electricity (i.e. a flow of electrons) does not pass through pure water. In order for electrons to move through a solution they must be shuttled by ions. Thus, the solutions that conducted electricity contained ions. List the ions that exist in each of these solutions: HCl(aq), NaOH(aq), $CuSO_4(aq)$.
3. Define acid. Define base.
4. Why is acetic acid written as $HC_2H_3O_2$ rather than $C_2H_4O_2$?
5. Distinguish between dissociation and ionization. Which compounds dissociate? Which ionize?
6. Explain why 5 M $HC_2H_3O_2$ conducts electricity but pure $HC_2H_3O_2$ does not?
7. What is the difference between a strong acid and a weak acid?
8. Define percentage ionization.
9. Which acid did we use in the lab that would be classified as a strong acid? Which was a weak acid?
10. Based on the results from today's lab, which had more ions: 1 M HCl or 5 M $HC_2H_3O_2$? Explain.
11. List four strong acids. What do you think A and M stand for in the summary equations on page 366?
12. Identify each as an acid, base, salt, or other: H_2SO_3, KOH, CH_3OH, $HC_3H_5O_2$, $Na_2C_2H_3O_2$, $Ba(OH)_2$.