Remote HW #3 (Based on Video #3) Topic: Lemon Battery (Part 1)

Name:
Note: Data will be provided so that you don't have to do the experiment.

Pre Lab Questions:

1. What is the difference between simulation vs. hands on labs
   According to Steve, Simulation is for data and hands on for understanding.

2. Why did Sam and Derick fail to light up the LED?
   Because Sam and Derick did not do the simulation before hands on

3. Why was Steve successful lighting up the LED?
   Because he did PHET simulation before doing the hands on.

4. What is a battery? Who invented it?
   Battery is a device with two terminals, anode (+) and cathode (-) to create potential difference between these two terminals.

5. What is an electrolyte?
   A liquid that contains ions. Lemon is a good source of electrolyte

6. What is anode and cathode?
   Anode (+) and cathode (-) terminals
7. What are the differences between potatoes and lemons?

   According to the table below, more voltage produced by the lemon since the pH of a lemon (2) is lower than the potato (6) that means the lemon is more acidic which means a more acidic product is bound to produce more electricity and voltage.

8. How can we use lemons/potatoes to light up a LED?
   Electrons flow from the zinc electrode through the LED bulb to the copper electrode and the bulb lights up

9. What is pH?
   pH is a scale of acidity from 0 to 14. It tells how acidic or alkaline a substance is. More acidic solutions have lower pH. More alkaline solutions have higher pH

Data: I have collected the data for you. It is provided in the table below:

Quantity	1	2	3	4
Voltage (Lemons)	.96	1.4	2.3	3.2
Light up/not light up	N	N	Y	Y

Quantity	1	2	3	4
Voltage (potatoes)	.5	.8	1.2	1.6
Light up/not light up	N	N	N	Y

Post Lab Question:

1. **How do lemons convert chemical to electric energy?**

Lemons (and the potatoes) convert chemicals to electric energy. The anode (zinc nails) is placed in the lemon, the lemon juice is acting like an electrolyte. The moment the cathode (copper wire) is placed into the lemon that's when the electrical current starts to light up LED.

2. **What does electrolyte do in Battery? Is it acidic (pH 0-7) or basic (pH 7-14)**

An electrolyte is a very important part of a battery. It's usually an acidic base, lemons are about 2.2 pH and potatoes are about 6.2 pH. But an electrolyte is what makes a batteries circuit. Basically the anode and the cathode are connected or drawn together. The anode (-) wants to go be with the Cathode (+). If there was no electrolyte to separate the 2 they could just go right to each other and not create a circuit. But since there is an electrolyte in the middle of the 2 they have to go around, creating an electrical circuit. As the anodes move along to get to the cathode the electrolyte sits in the middle to keep them apart.

3. **Why do batteries eventually stop converting producing energy?**

Batteries as we all know eventually stop, our flashlights always seem to be dead but why? As I said above the anode is attracted to the cathode so the electrons travel on a circuit to get to the protons. But sometimes all the electrons have run out.