

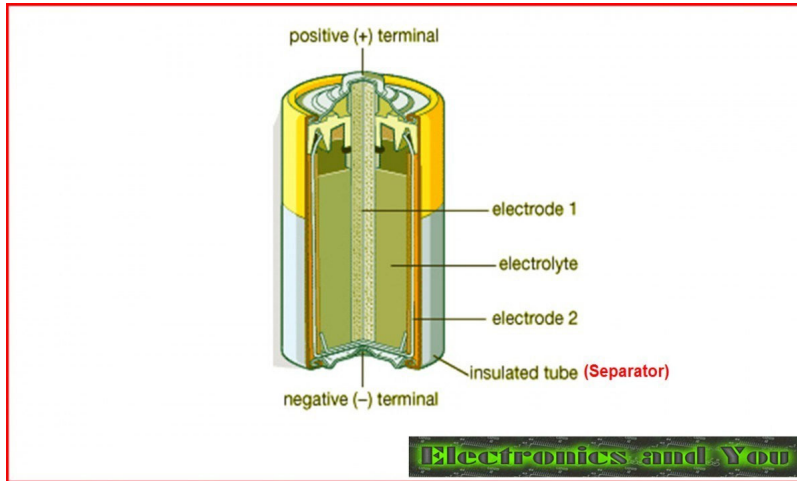
Get Energized! STEM Kit Class Discussion Questions

Note: The questions provided below are guide questions that students can discuss as a class in order to determine what they learned/took away from the kit.

Part 1: Make a Rechargeable Battery

1. What is an electrolyte and what role does it play in a battery?

An electrolyte is a catalyst that makes a battery conductive – promoting the movement of ions between metals. In our battery, the electrolyte is salt – in real batteries, it is usually an acid.



2. What metals did you find were the best at creating high voltage? The worst?
Typically, the best combination of metals is Copper (+) and Zinc (-). The worst tend to be Aluminum (+) and Stainless Steel (-).
3. How do you think the electrolyte created would vary in voltage if there were an increased concentration of halite? Decreased?
An increased concentration of halite may increase the voltage to a certain point and a decrease might decrease the voltage. This would make a great science fair research project for a student to determine the optimal concentration of halite for this experiment.
4. Do you think the results would change if the halite did not fully dissolve in the solution prior to the experiment? Explain.
If the halite were not fully dissolved, this would create a weak electrolyte and might affect the voltage readings at the beginning of the experiment.
5. What combination of cells produced the highest voltage? Why are some metals better at conducting electricity than others?
This will vary among the students, but typically Copper and Zinc and Stainless Steel and Aluminum will make the best overall combinations to get the LED to light up. Some metals have a higher resistivity (how strongly it resists or conducts electric current), which makes them less conductive. Lower resistivity leads to higher conductivity.
6. What strategy did you use in order to determine the best combination of cells?
Students hopefully referred back to the data they collected into their table to determine the best combinations, but some will simply do trial and error.
7. What happens if one of the cells is put in the stack upside down?
If one of the cells is put in the stack upside down, it will subtract from the overall voltage total instead of add to it.

8. How could you get the LED light to shine brighter? Dimmer?
Students could try a different electrolyte solution or trying different battery combinations. This would also make a good science fair question for a student.

Part 2: Make a Solar Cell

1. How do you think sunlight is converted into electricity?
The black oxide on Solar A is a photovoltaic semiconductor. This means that light can be used to move electrons away from the Cu_2O nuclei. "Electron Holes" are created when the electrons move away from the nuclei. These electrons form negative ions in the electrolyte. Solar B begins to gain too many electrons, so they start to flow back to Solar A (through the multimeter) to fill the holes. Electricity is just moving electrons. Here we have a simple way to move electrons with just light.
2. What angles were most effective at producing a higher current? Explain.
The best angle is when the light is perpendicular (90°) to the washers because this is when the most light is absorbed into the system.
3. Why are solar panels on buildings tilted?
So they are as close to perpendicular to the sun as possible.

Part 3: Recharging the Battery

1. How many washer solar cells do you think you would need to recharge your washer-cell battery?
In full sun, the Solar A/B cell generates 1 milliamp of current. A typical battery charger gives 80 milliamps of current. So we would need around 80 washers and the sun.



Teacher Feedback Survey:

http://dat.cns-eoc.colostate.edu/STEMkits/stem_kit_survey.php

Thank You!