

Lab Activity 2: Lighting an LED with a lemon battery.

Materials

- digital multimeter (DMM)
- alligator clip leads (two different colors)
- three to six fresh lemons
- one red LED
- zinc, lead, and copper plates

It's go time! You have 40 minutes to help Juan get into the qualifying heat by lighting the light-emitting diode (LED) on his car. First, review what you know about voltages from Lab Activity 1: Which metals make the best lemon battery? An LED usually needs about 3V to light up. Can you provide this with a lemon battery?

(**Note:** Small electronic devices need more than one battery to operate; multiple batteries can be arranged in series [to provide more voltage] or in parallel [to provide more current].)

Prediction and design

What combinations of metals and lemon(s) can offer an overall voltage of at least 3V to light up Juan's LED? Do you need more than one lemon? Will you use series or parallel connections, or both? Draw a picture of the lemon(s), metals, and connections that you predict will light up Juan's LED.

Testing

Test your design using the LED and DMM. Did it work? If not, experiment with different combinations of metals and series and parallel configurations until you are successful. Take notes and make drawings as you proceed. Sketch your final arrangement of the metals and lemon batteries.

(**Hint:** If you are providing enough voltage but the LED still will not light, you may need to increase current flow. You can measure current with your DMM.)

Extension

Juan qualified for the finals using your circuit to light his LED. Draw your winning circuit again, using electronic circuit symbols to make a more formal record of your design.

Conclusions

What have you learned about the connection between chemistry and electric circuits? Why are dissimilar metals important in the function of a battery?