UV LIGHTS

Equipment for
" All-Weather Testing of Natural and Artificial UV Protection"

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Objective: Make a pair of UV lights for controlled experiments in exploring the protection of sunscreens, sunglasses, clothing, hair, and other materials from the SunÍs ultraviolet radiation.

Materials per pair of lights:

- 2 UV LEDs from All Electronics Corp. (operates best 3.7 volts and 20 milliamps; $1.75 each at -- http://www.allelectronics.com/cgi-bin/category.cgi?category=search&item=ULED-1&type=store)
- 1 270-ohm resistors ($0.50 each at All Electronics Corp. -- http://www.allelectronics.com/matrix/One_Half_W_Resistors.html)
- 1 9-volt battery and holder (available at most local electronic stores)
- 3 3-inch pieces of plastic covered wire with 0.25 to 0.5 inches striped from each end
- base of plastic sandwich-size container (lid could be used to protect LEDs during storage)
- screw-type wire connectors (smallest size) available at most local electronic and hardware stores for less than $0.10 each)
- 1 rubber band

If you canÍt get the above UV LEDs, you will need to recalculate the resistance of the resistor.

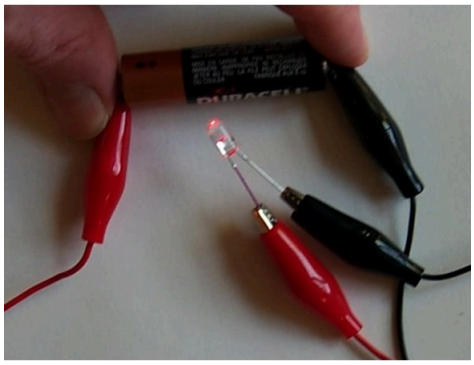
For example, to obtain the required resistance for the above UV LEDs:

(9 volt battery Æ 3.7 volts required for LED) / 0.020 amp = 265 ohms (270 ohms is close enough and is commonly sold in electronic stores)

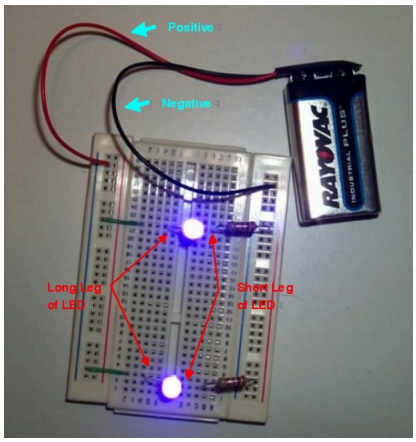
For additional information on this calculation, see the Java script calculator.

Connecting the Wires

First, Light Emitting Diodes (LEDs) require electricity to run in the proper direction Æ they will not work if wired backwards! So remember, the shorter wire of the LED must be connected to the negative charge, and the longer wire of the LED must be connected to the positive charge. Or, **red** to long, and **black** to short.



You will be making a parallel circuit Æ where the red wire coming from the battery is connected to each long leg of the LEDs. A 270-ohm resistor is connected to the short leg of each LED, which in turn is connected to the black wire coming from the battery.



Building Steps

Working with the plastic container, **first** use an awl, pin, pen, or ice pick to poke 4 holes in the plastic container. It might help to make a paper template so the spacing for each set of 2 holes is placed equidistant from the edges of the container. Each set of 2 holes are approximately 0.5 inch apart.

Second, place the LEDs on the inside of the box and push the wire leads through the holes.

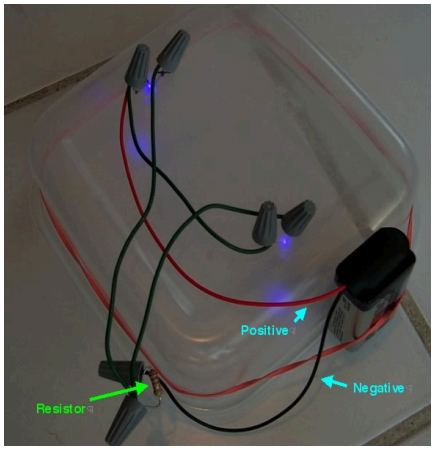
Third, connect the wires to the LEDs, resistor and battery.

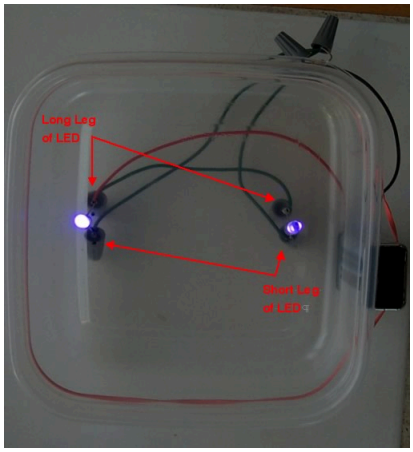
- a) Wrap the POSITVE (red) battery wire to the long lead of one LED.
- b) Wrap one end of a 3-inch piece of wire (green in this case) with the red battery wire and the LED.
- c) Twist a wire connector around the three wires.
- d) Wrap the free end of the green wire to the long lead of the second LED; twist a wire connector around the two wires.
- e) Connect one end of each of the remaining two 3-inch pieces of green wire to the short leads of each LED; twist a wire connector around the two wires.
- f) Connect the two free ends of the green wires around a lead from the resistor (any end of the resistor will work). Twist a wire connector around the three wires.

- g) Connect the black wire from the battery to the free end of the resistor and twist a wire connector around the two wires.

Finally, put the rubber band around the outside of the box and secure the battery to the box with the rubber band. To operate, connect the battery leads to the battery.

Make sure the LEDs are pointing directly down when operating. To secure the LEDs in place you can pinch together the LED leads that poke out of the box Æ but do not let the wires touch!





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