Curiosity Guide #604
Electric Lights

Accompanies Curious Crew, Season 6, Episode 4 (#604)

Colored Lights

Investigation #6

Description

How long can a colored light last?

Materials

- LED lights
- Small neodymium magnets
- Black electrical tape
- 3-volt watch batteries
- A magnetic surface like a refrigerator

Procedure

1) Place a battery in between the legs of the LED so the long leg crosses the positive face of the battery.
2) The LED should turn on when you squeeze it.
3) Wrap a short piece of electrical tape around the battery and LED legs.
4) Let a small magnet attract to the battery.
5) Wrap the battery, LED, and magnet with a second piece of tape.
6) Gently toss the assembly toward a magnetic surface like a refrigerator.
7) How long do you think the light will last?

My Results

Explanation

Light-emitting Diodes, or LEDs, are an efficient source of light because little energy is transferred as heat. Each diode consists of two combined sections. On one side, the electrons are in a highly energized state, but when the current moves to the opposite relaxed side of the diode, the electrons fall to a lower energy level and the extra energy is transferred to light. How much the energy falls determines the frequency, or color of light, that is released. Even though the LED plastic shell might be green, the light that is emitted is also green. A single battery can last months, and the neodymium magnet will stick to a magnetic surface indefinitely. These magnets can easily pinch fingers, so they should be handled carefully.

Engineers continue to refine light bulbs. Fluorescent bulbs contain mercury and argon gas particles that move excitedly when bumped by the electricity passing through the tube. The gas particles give off ultraviolet light that gets absorbed by the tube's inner coating and emit light we can see. Other vapor-filled bulbs include sodium, mercury, and metal halide lamps. When the sodium or mercury particles get energized, they give off visible light so there is no need for the fluorescent coating. LED bulbs emit light when electrons travel from an excited side of a diode to a relaxed one. Pretty efficient!

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