



FLASHLIGHTS

By definition, a flashlight is a portable, battery operated device used for illumination. A typical hand-held flashlight consists of one or more dry cell batteries arranged in a line inside a compartment that forms the handle of the light. The flow of electricity from the batteries to the bulb at the front end of the light is controlled through a switch mechanism placed between the batteries and the bulb.

Flashlights have multiple uses. We use them during emergencies such as power outages or when our car breaks down. Our parents may use them while searching through the attic, the basement, or a dark closet. You may have used one when you played Hide-and-Seek in the dark or walked down the street while trick-or-treating. Everyone has used a flashlight at one time or another and by doing so, energy has been transformed.

Energy is the ability to do work or cause a change. The law of conservation of energy states that “energy cannot be created nor destroyed, but it can be transformed from one form to another.” There are many different forms of energy, such as chemical potential energy, electrical energy and radiant (light) energy – which is part of the electromagnetic energy spectrum.

What energy transformations occur when we use flashlight? First, the batteries contain **chemical potential energy**. This is the energy that is produced by the rearrangement of electrons in atoms and molecules. When chemical bonds are formed, electrons are transferred from one atom to another. This movement of electrons produces chemical energy. This energy is then **converted** to electrical energy.

Electrical energy is the effect of moving electrical charges from one point to another in a conductor. Electrical charges moving through a conductor is called electricity. Electric current is the way in which electrical energy is transported to places where it is needed and converted into other forms. In this case that form is radiant (light) energy which is part of the electromagnetic spectrum.

Light energy is a type of wave motion. That is, light is a form of energy caused by light waves. It enables us to see, as objects are only visible when they reflect light into our eyes.

Chemical Potential Energy 1. The battery is an example of what form of energy?

Changed 2. In paragraph 4, what does **converted** mean?

- C** 3. Which is not an example of a metal conductor?
a. copper b. mercury c. glass d. aluminum
- D** 4. All of the following are involved in the energy transformations within a flashlight except:
a. electrical energy. b. radiant energy. c. chemical potential energy. d. mechanical energy.

- B** 5. According to the law of conservation of energy, ideally, the chemical potential energy provided by the battery should be ____ the electrical energy.
a. less than b. equal to c. more than d. none of these

Energy Transformations

The Law of Conservation of Energy states that energy can't be created or destroyed. Instead it must be converted, changed, or transformed, into another form of energy.

Fill in the blanks with the beginning and ending forms of energy in the five examples of energy transfers.

Choices: nuclear, electric, radiant, sound, thermal, mechanical



1. Event: A flashlight is turned on

Chemical Potential Energy → Electrical Energy + Radiant (Light) Energy + (Thermal energy)



2. Event: Turning on a hair dryer

Electrical Energy → Mechanical Energy + Thermal Energy + Sound Energy

3.



- Event: Running a dishwasher

Electrical Energy → Mechanical Energy + Thermal Energy + Sound Energy



4. Event: Wind Turbine

Mechanical Energy → Electrical Energy



5. Event: Microwave heats spaghetti

Electrical Energy → Radiant (Light) Energy + Thermal Energy (and/or Mechanical Energy and/or Sound Energy)
