kinetic energy: the energy an object has because of its motion.

light energy: visible energy that is given off by some objects in the form of radiation.

radiation: energy that moves in the form of rays, waves, or particles.

Energy in the Crookes Radiometer

The Crookes radiometer is a device used to detect the presence of light energy. Flags are mounted on a spindle inside a sealed glass bulb. Most of the air is removed from inside the radiometer. When no direct light shines on the radiometer, the flags do not move, and the radiometer is at rest.

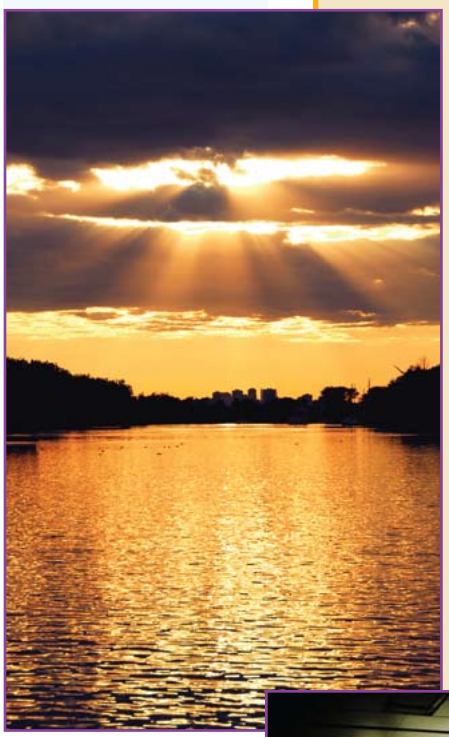
When light is shined on the radiometer, a change takes place. The flags begin to rotate on the spindle. This motion is an indicator that energy is transformed into the radiometer's motion.

Something in the design of a radiometer transforms the energy in light into the energy of motion. When the flashlight is closer to the radiometer, more light shines on it, and the flags move more quickly. When the flashlight is farther away, less light shines on the radiometer, and the flags move more slowly or not at all.

The energy of movement is called **kinetic energy.** This motion can be in a straight line, like a raindrop falling from the sky, or in a circle, like the flags in the radiometer, or along any type of path. Spinning objects, such as tops, also have kinetic energy. Any time you can detect motion in an object, you can say that the object has kinetic energy.

The energy of light, called **light energy,** is another form of energy. You know light energy is present when you see light. Light energy is given off by objects such as the Sun or a light bulb. Light energy travels through empty space and also through air, water, and many other materials. Light energy is a form of *electromagnetic* **radiation**. Radiation is energy that travels in the form of rays, *waves,* or particles. (You will be learning more about electromagnetic radiation and how it travels later in this Unit.) The root word *radio* means "ray." This same root word is used in the words *radiation* and *radiometer*.

A radiometer transforms light energy into the kinetic energy of the flags. You will be identifying other examples of energy transformations throughout this Unit.



Light energy from the Sun travels in the form of electromagnetic radiation.

Moving trains have kinetic energy.

Energy in a Flashlight

A flashlight also uses energy and transforms energy. It transforms energy stored in a battery into light energy. When a flashlight is turned on, the filament of the bulb begins to glow, and the flashlight **radiates** light. The change in the filament and the presence of light are both indicators that energy is being transformed. You can use your sense of sight to detect these indicators.

When you see a light bulb glowing, you can infer that the bulb is transforming energy. The filament of a bulb shines because *electricity* flows through the filament. Electricity is a form of **electrical energy** that flows between the negative and positive terminals of a battery. You cannot see the electrical energy, but you know that a light bulb needs electrical energy to glow.

In the case of a flashlight, the source of the electrical energy is the **chemical energy** stored within a battery. Chemical energy is energy that is stored until it is released by the reaction of chemicals in the battery. When the positive and negative terminals of a battery are connected by a wire, chemicals in the battery react to release energy to the wire.

When a flashlight is turned on, two energy transformations take place. First, chemical energy in the battery is transformed into electrical energy that travels through the filament wire. Then, the electrical energy traveling through the filament heats the filament and causes it to radiate light energy. The light energy given off by the flashlight is an indicator that chemical energy in the battery is transformed into electrical energy in the wire, which is transformed to the light given off by the flashlight.

Chemical energy stored in batteries is transformed to light the light.

radiate: give off energy.

electrical energy: the energy of moving electric charges.

chemical energy: energy stored in chemical bonds.