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Different Forms of Energy

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There are very many forms of energy, such as electric energy, chemical energy, and light energy. Each of these forms of energy can be thought of as either potential energy or kinetic energy. After examining the various forms of energy, it is important to remember two things. First, whenever a change occurs in nature, energy changes from one form into another. Second, energy is always conserved. The total energy in an object, or in a group of objects, remains the same. Energy cannot be seen or measured directly. However, the energy an object has may be determined from things that can be seen and measured. In this article we will explore the ways energy can be measured. One way to determine the amount of energy an object has is to investigate the changes it causes. If a small marble falls from a height of 10 centimeters (cm) onto your finger, it produces only a small change in your finger. However, if you drop the same marble from a height of 5 meters (m), the change is much greater. Your finger hurts! The change depends on the potential energy of the marble. The higher an object is, the greater its potential energy. If you replaced the marble with a heavy bowling ball, the changes in your finger would be very large indeed. The potential energy of an object depends on two things that can be measured. It depends on the weight of the object and on its height. The weight of an object, in turn, depends on the force of gravity. For this reason, the potential energy is called gravitational

potential energy (GPE). It is the potential energy an object has due to its position above the earth's surface [1].

A moving object can also cause changes. Imagine your finger is pressed against a wall close to the floor. A marble rolling across the floor hits your finger. The changes in your finger depend on the marble's speed. The greater the speed is, the greater the changes. The kinetic energy depends on the speed of the object. But what would happen to your finger if a slow-moving bowling ball banged into it? Quite a change! Remember, kinetic energy depends on both the mass and the speed of an object.

Moreover, energy is important because it is conserved. The total energy in an object, or in a group of objects, always remains the same. The total energy is the sum of the different kinds of energy an object has. As the roller coaster in Figure 1 starts its run, it has only GPE. What happens to the energy of the roller coaster system during the ride? You know the total energy must stay the same. The energy just changes from one form to another.

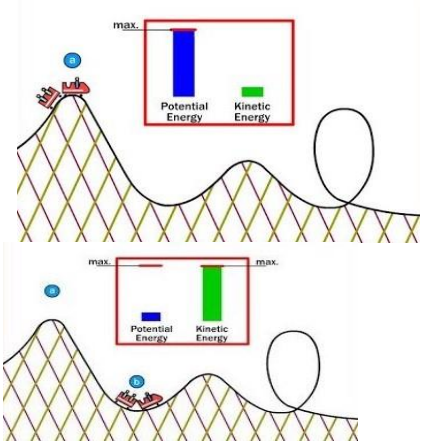

Figure 1. Conservation of Energy of the Roller Coaster System

On the way down the roller coaster loses potential energy and gains kinetic one. At the lowest point during the ride, the roller coaster has the greatest speed. So it has the greatest kinetic energy. But at the same time it has the least potential energy. However, the total energy remains constant. As the roller coaster bumps, rubs, and grinds against the rails, heat energy is produced. It means that when the heat energy increases, the kinetic energy must decrease. If you add up the potential, heat, and kinetic energies anywhere during the ride, you always get the same answer.

Energy Conversion. Have you ever wondered, what happens to you when you go up? Look at Figure 2. You gain potential energy every time you walk up stairs. Your muscles pull your body against the force of gravity, doing work. In theory, the potential energy your body gains as you climb is exactly the same as the food energy it loses: one form of energy is simply converted into another. (In practice, you need to use more energy than you might think because your body wastes quite a lot of energy in the process).

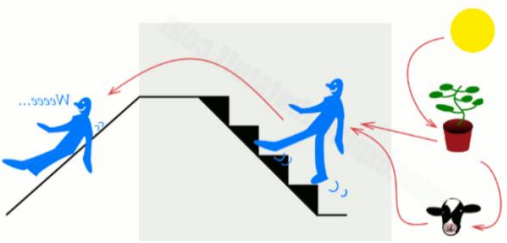

Figure 2. Physical Meaning of Energy Conversion

At the top of a flight of stairs, you could turn your stored potential energy back into kinetic energy (movement) in various ways, such as sliding down the banisters or jumping down a fireman's pole! You can trace every bit of energy your body uses back to the food you eat, which comes from animals and plants and ultimately from the Sun.

Energy Conversion Technology. Energy conversion technology refers to any system that converts energy from one form to another. Energy can be described in many ways, with different forms of energy including heat, work, and motion. Moreover, potential energy can be in the form of nuclear, chemical, elastic, gravitational or radiant energy. All of these can be converted into useful energy, with the one of the most common and versatile forms being electricity. The main goal of power plants is to take a fuel like coal, natural gas or uranium, and transform it into electricity. This makes power plants an energy conversion technology, and they are the largest energy conversion technologies by far.

In fact our own bodies are extremely complex conversion technologies. They take chemical energy from food and convert that into different forms of mechanical energy that we need in order to operate. Our body can then use this energy to convert into many other forms: heat, movement, sound, gravitational potential energy, etc.

References:

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