

# TYPES OF ENERGY

# ENERGY IS.....

Energy is the power or ability to make this happen. It makes change possible. Scientists define Energy as the ability to do work. Energy can neither be created nor destroyed.

Turn to your neighbor and share ways you see energy used everyday....

Energy is what makes cars move and airplanes fly!

<https://www.schooltube.com/video/617c60f7739a4a8c53b3/>

# LAW OF CONSERVATION

Law of Conservation of energy states that energy CAN change from one type to another. Energy CANNOT be destroyed, lost, or disappear.

Think of an example where energy changes from one type to another.

# KINETIC ENERGY

All moving things have kinetic energy. It is energy possessed by an object due to its motion or movement. These include very large things, like planets, and very small ones, like atoms. The heavier a thing is, and the faster it moves, the more kinetic energy it has.

Temperature is the measurement of kinetic energy.

\*Ball experiment\*

# POTENTIAL AND GRAVITATIONAL ENERGY

**Note the following:**

1. Both balls had potential energy as they rested on the table.
2. By resting up on a high table, they also had gravitational energy.
3. By moving and falling off the table (movement), potential and gravitational energy changed to **Kinetic Energy**. Can you guess which of the balls had more kinetic energy?

<http://www.eschooltoday.com/energy/kinds-of-energy/what-is-gravitational-energy.html>

# CHEMICAL ENERGY

**Definition:** energy stored in the form of chemical bonds



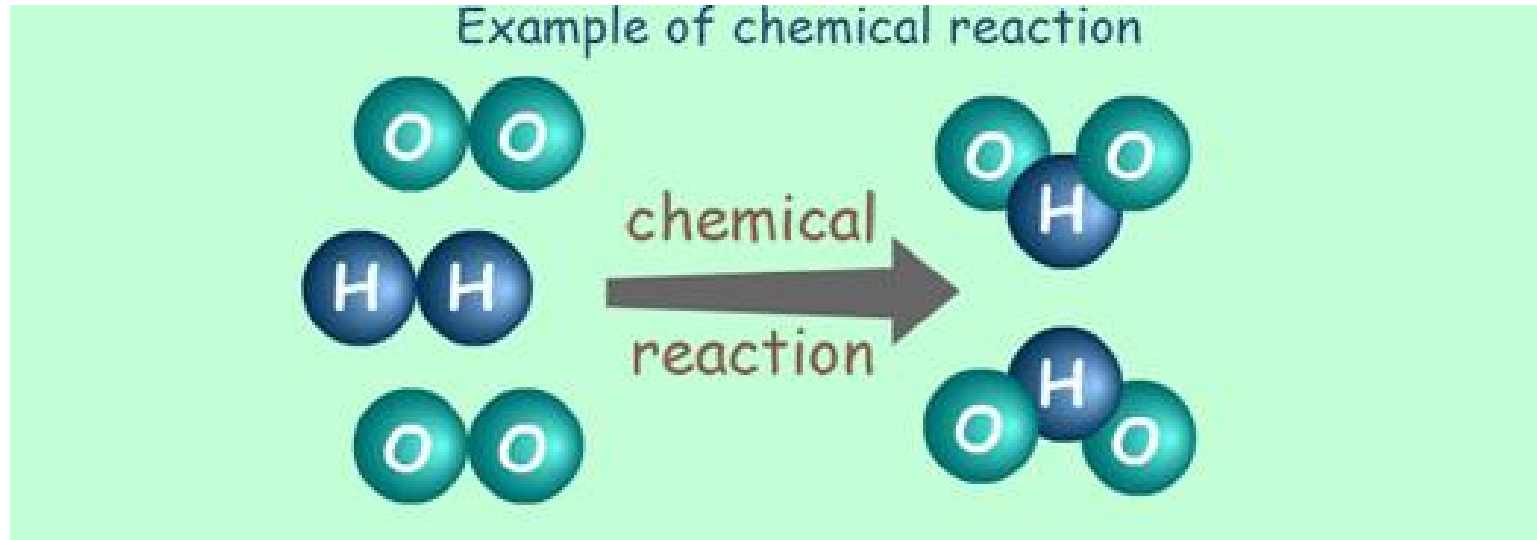
Chemical Energy is energy stored in the **bonds of chemical compounds (atoms and molecules)**. It is released in a chemical reaction, often producing heat as a by product (**exothermic reaction**). Batteries, biomass, petroleum, natural gas, and coal are examples of stored chemical energy. Usually, once chemical energy is released from a substance, that substance is transformed into an entirely new substance.

For example, when an explosive goes off, chemical energy stored in it is transferred to the surroundings as thermal energy, sound energy and kinetic energy. The dry wood is a store of chemical energy. As it burns in the fireplace, chemical energy is released and converted to thermal energy (heat) and light energy. Notice that the wood now turns into ashes (a new substance)

# CHEMICAL ENERGY CONT

Food is also a good example of stored chemical energy. This energy is released during digestion. Molecules in our food are broken down into smaller pieces. As the bonds between these atoms loosen or break, a chemical reaction will occur, and new compounds are created. When the bonds break or loosen, oxidation occurs almost instantly. A chemical reaction is involved in this breakdown. The energy produced keeps us warm, maintain and repair bodies, and makes us able to move about. Different foods store different amounts of energy. Energy in food is measured in kilocalories (or Calories).

Turn to your neighbor and give some examples of chemical energy



# MECHANICAL ENERGY

Definition: energy related to motion and movement

Mechanical energy is often confused with **Kinetic** and **Potential Energy**. We will try to make it very easy to understand and know the difference. Before that we need to understand the word '**Work**'.

'**Work**' is done when a force acts on an object to cause it to move, change shape, displace, or do something physical. For, example, if I push a door open for my pet dog to walk in, work is done on the door (by causing it to open). But what kind of force caused the door to open? Here is where **Mechanical Energy** comes in.

**Mechanical energy** is the sum of kinetic and potential energy in an object that is used to do work. In other words, it is energy in an object due to its motion or position, or both. In the 'open door' example above, I possess potential chemical energy (energy stored in me), and by lifting my hands to push the door, my action also had kinetic energy (energy in the motion of my hands). By pushing the door, my potential and kinetic energy was transferred into mechanical energy, which caused work to be done (door opened). Here, the door gained mechanical energy, which caused the door to be displaced temporarily. Note that for work to be done, an object has to supply a **force** for another object to be **displaced**.

\*Do Example\*



# MECHANICAL ENERGY CONT

(1) The iron hammer on its own, has no kinetic energy, but it has some potential energy (because of its weight).

(2) To drive a nail into the piece of wood (which is work), he has to lift the iron hammer up, (this increases its potential energy because of its high position).

(3) And force it to move at great speed downwards (now has kinetic energy) to hit the nail.

The sum of the potential and kinetic energy that the hammer acquired to drive in the nail is called the Mechanical energy, which resulted in the work done.

# HEAT ENERGY

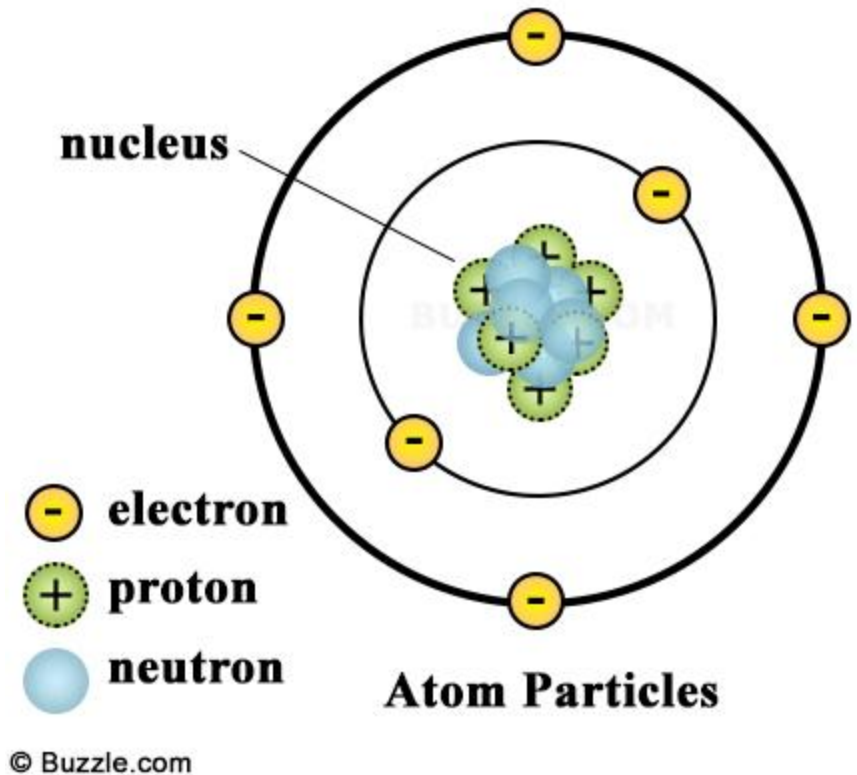
Definition: energy transferred by collision of particles.

We will have an entire unit on this form of energy

# ELECTRICAL ENERGY

Definition Stream of electrons moving through a substance

Diagram of an atom

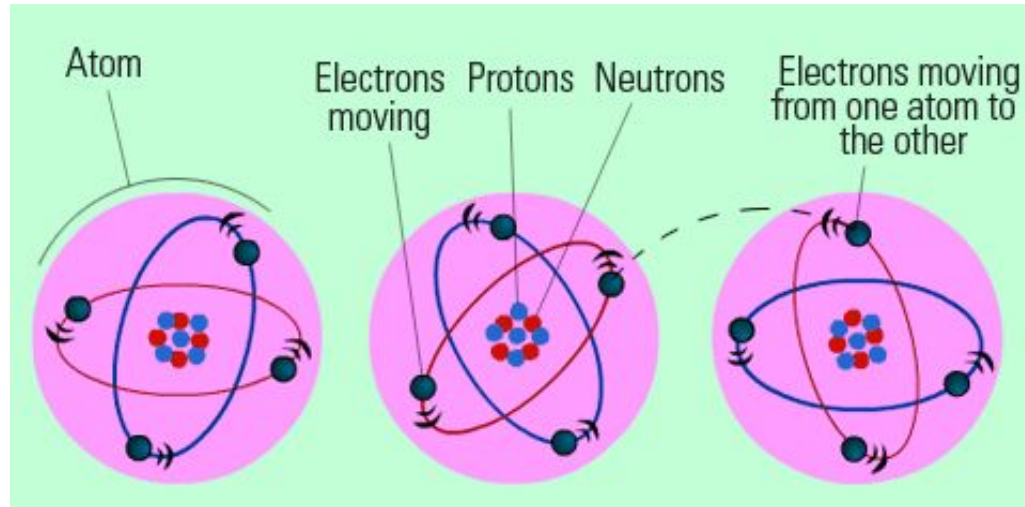


Matter is made up of atoms. In these atoms, there are some even small stuff called **electrons** that are constantly moving. The movement of these electrons depend on how much energy is has. This means every object has **potential energy**, even though some have more than others.

# ELECTRICAL ENERGY CONT.

Humans can force these moving electrons along a path from one place to the other. There are special mediums (materials) called conductors, that carry this energy. Some materials *cannot* carry energy in this form, and they are called insulators. We generate **electrical energy** when we succeed to cause these electrons to move from one atom to the other, with the use of magnetic forces. Once we harness electrical energy, it can be used for work or stored. **How does an electric current work?** A battery transfers stored chemical energy as charged particles called electrons, typically moving through a wire. For example, electrical energy is transferred to the surroundings by the lamp as light energy and thermal (heat) energy. Lightning is one good example of electrical energy in nature, so powerful that it is not confined to a wire. Thunderclouds build up large amounts of electrical energy. This is called static electricity. They are released during lightning when the clouds strike against

each other.



# WAVE ENERGY

Definition energy transmitted by a disturbance in space.

# SOUND ENERGY

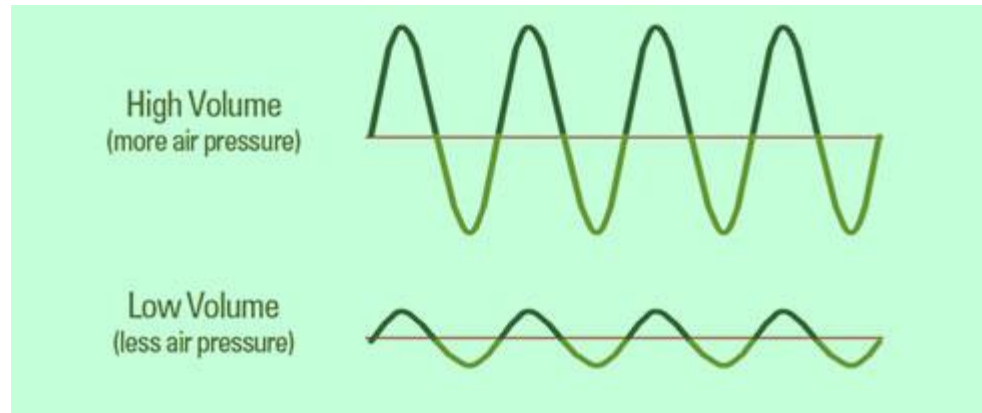
Sound is the movement of energy through substances in longitudinal (compression/rarefaction) waves. Sound is produced when a force causes an object or substance to vibrate — the energy is transferred through the substance in a wave. Typically, the energy in sound is far less than other forms of energy.

A vibrating drum in a disco transfers energy to the room as sound. Kinetic energy from the moving air molecules transfers the sound energy to the dancers eardrums. Notice that Kinetic (movement) energy in the sticks are being transferred into sound energy. Sound vibrations create sound waves which move through mediums such as air and water before reaching our ears.

Sound energy is usually measured by its pressure and intensity, in special units called **pascals and decibels**. Sometimes, loud noise can cause pain to people. This is called the **threshold of pain**. This threshold is different from person to person. For example, teens can handle a lot higher sound pressure than elderly people, or people who work in factories tend to have a higher threshold pressure,

because they get used to loud noise

in the factories.



# NUCLEAR ENERGY

Definition energy produced by fusion or fission.