

# Energy and Matter

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# What is Energy?

- Energy is the ability to do work or cause change.
- Every chemical or physical change in matter involves a change in energy
- Energy is not created or destroyed. It is transformed from one form to another.

# Forms of Energy

- 1) Thermal Energy
- 2) Chemical Energy
- 3) Electromagnetic Energy

# Thermal Energy

- Thermal Energy: Total energy of particles in an object
- Not the same as temperature - measure of the average energy of random motion of particles in matter.
- Two types of thermal energy:
  - 1) Endothermic – energy is taken in -
  - 2) Exothermic – energy is given out (released)

## Examples

- 1) Combustion (a fire)
- 2) The reaction of sodium hydroxide and water (that we saw in our lab on Friday).

# Chemical Energy

- Chemical Energy: The energy stored in the bonds between atoms
  - *atoms are the particles that makes all elements and bonds are how atoms connect*
- *When a chemical change happens, bonds break and new ones are formed.*

# Electromagnetic Energy

- Electromagnetic energy is a type of energy that travels through space in waves (examples: sunlight, microwaves, X-rays)
  - More on this in later units!

# Energy Transformation

During a chemical change:

- Chemical energy may be changed to other forms of energy
- or
- Other forms of energy may be converted to chemical energy.

Example: Photosynthesis (photo: light and Synthesis: to make)

- The process by which plants use sunlight to make foods from carbon dioxide and water is an example of conversion of electromagnetic energy from the sun to chemical energy (plants make sugar)