



**ENERGY**

# What is Energy?

Energy is defined as the ability to do work, that is, *produce certain changes* within a system.

## Types (forms) of energy:

- Mechanical
- Chemical
- Electromagnetic
- Heat (Thermal)
- Nuclear



- We cannot directly observe energy 😊
- We can observe how *energy makes matter change* in numerous ways (for example, change of physical properties, change of state, change of position etc.)
- We can observe how energy changes its *form*.

# Mechanical Energy

Energy due to an object's **motion** or **position**.



# Chemical Energy

Chemical energy is an inherent energy of a substance due to its chemical composition:

- All compounds are held together by chemical bonds.
- All types of **chemical bonds** have specific **stored energy that can be released** (transferred to another form, for example, heat or light) **when the bonds are broken** in a chemical reaction.



# Electromagnetic Energy

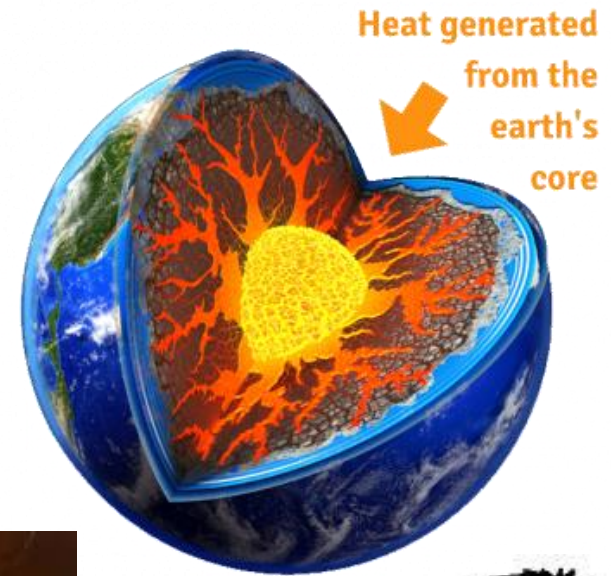
Electric (from electric fields), Magnetic (from magnetic fields),  
Radiant (from electromagnetic radiation including *light*)



# Thermal Energy

Thermal energy originates from the individually **random**, or disordered, **motion of particles** in a substance:

- All objects constantly give off or gain thermal energy.
- Heat is an **amount of thermal energy being transferred** in a given process in the direction of decreasing temperature.

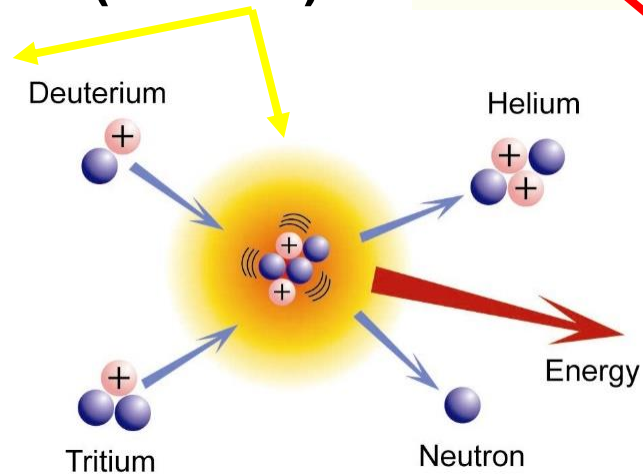
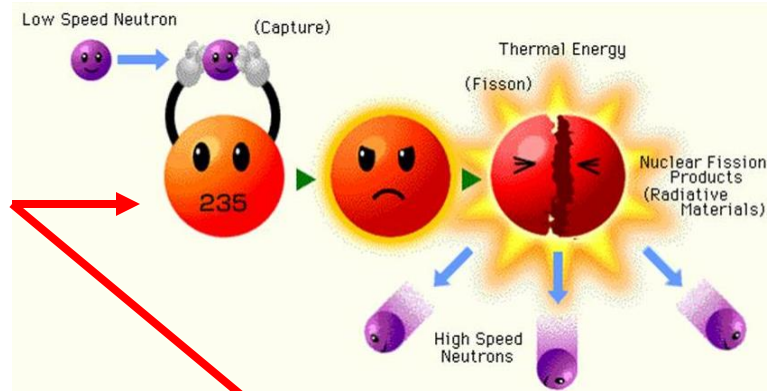


# Nuclear Energy

Energy stored in the nucleus of an atom.

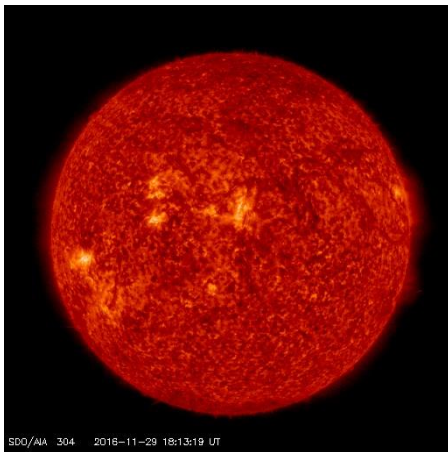
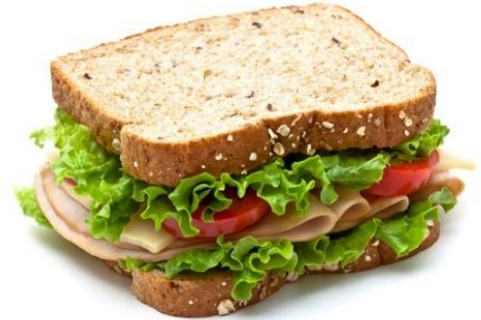
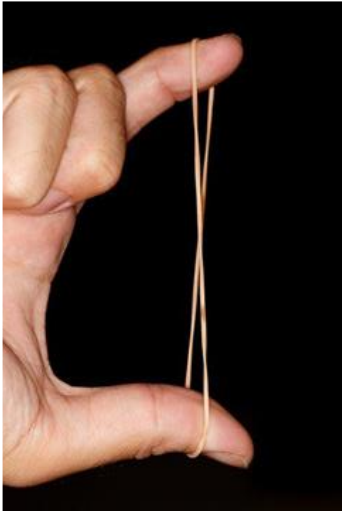
**Nuclear energy** is released in the form of heat and light when:

- the nucleus splits (**fission**)
- the nuclei collide at high speeds and join (**fusion**).



Nuclear energy is the **most concentrated** form of energy.

# What type of energy?

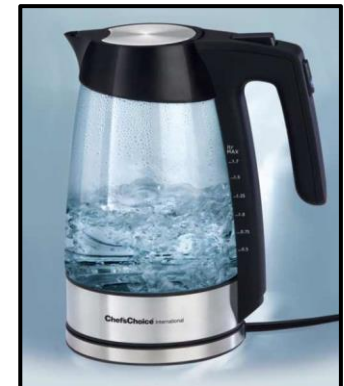
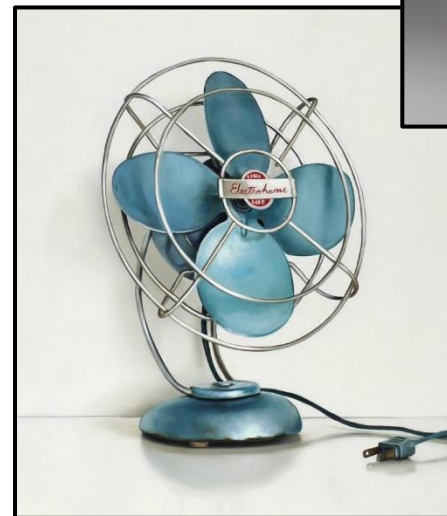


# Law of Conservation of Energy

Total energy of an isolated system is conserved over time: energy can be neither created nor destroyed, but can be transferred, or converted from one form or place to another.

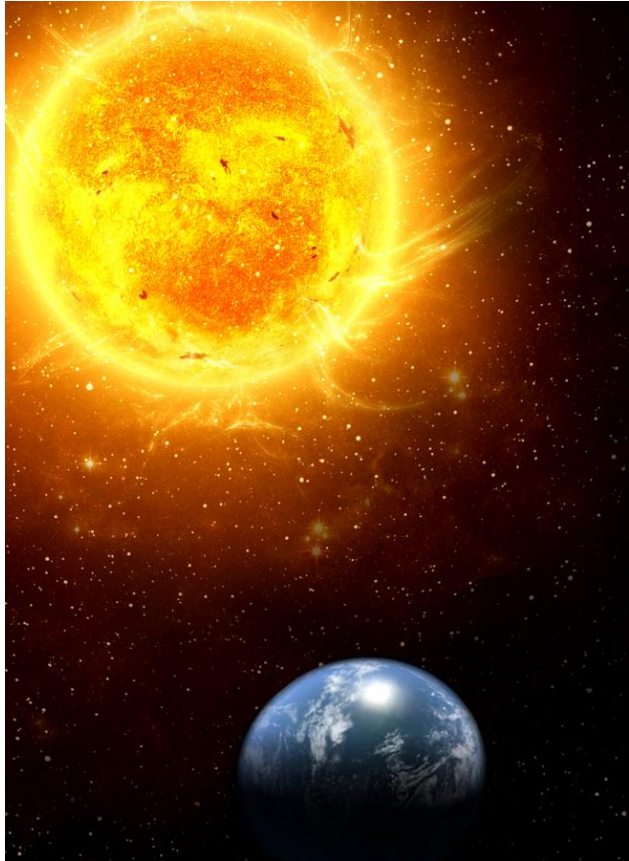


...and is converted into...



**Electrical energy** is transported to your house through power lines...

# More Energy Conversion Examples



**Light** from the Sun is reaching the Earth...

...and is converted into...

