



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 actually see 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

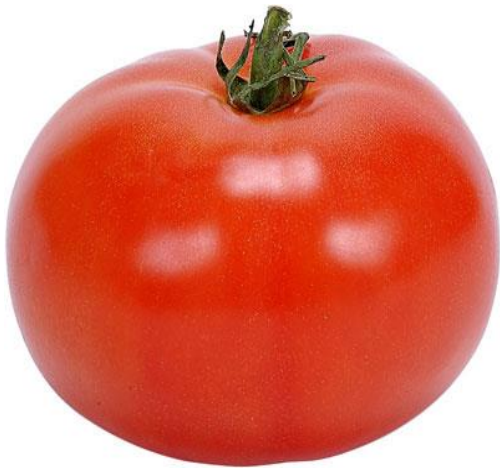
Energy due to an object's **motion** or **position**.
(kinetic) (potential)



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

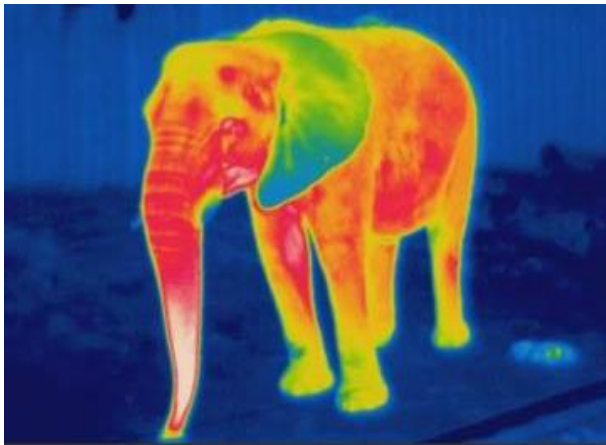
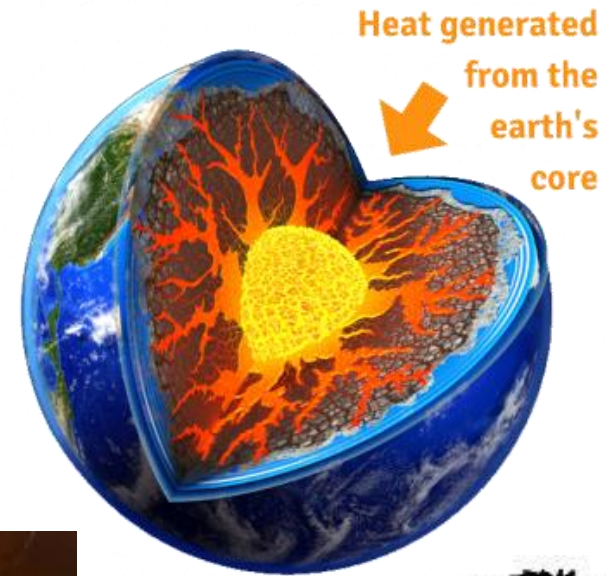
Electrical (from electric fields), Magnetic (from magnetic fields),
Radiant (from electromagnetic radiation including *light*)



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.

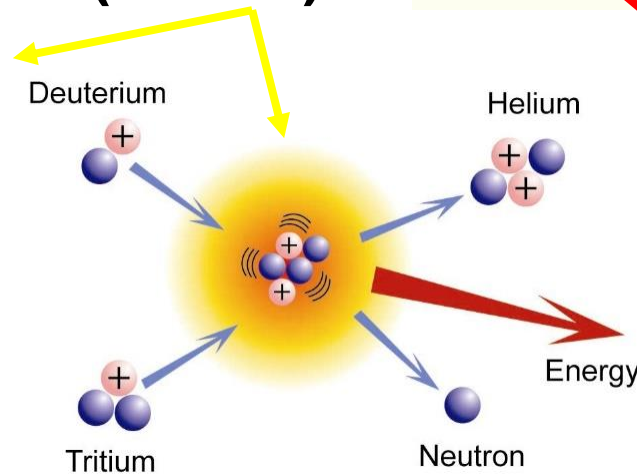
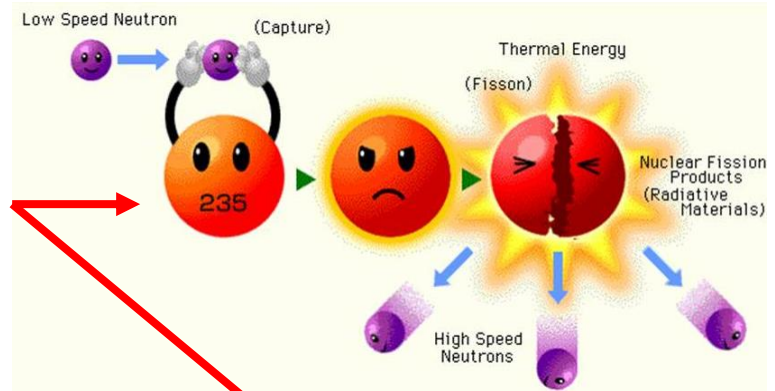


Nuclear Energy

Energy stored in the nucleus of an atom.

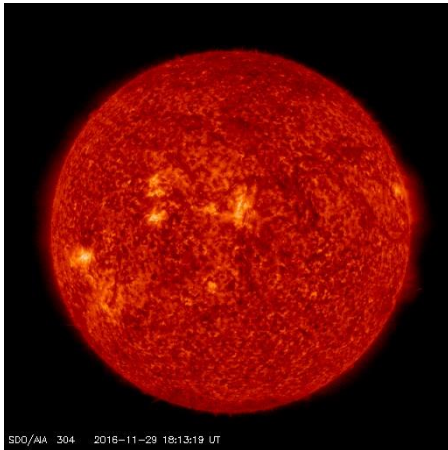
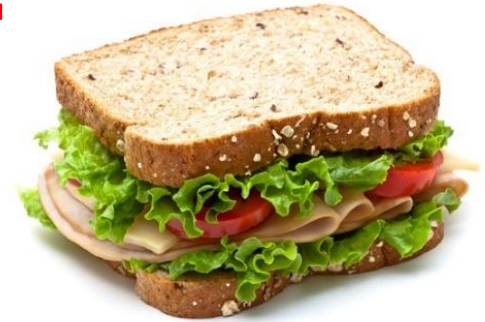
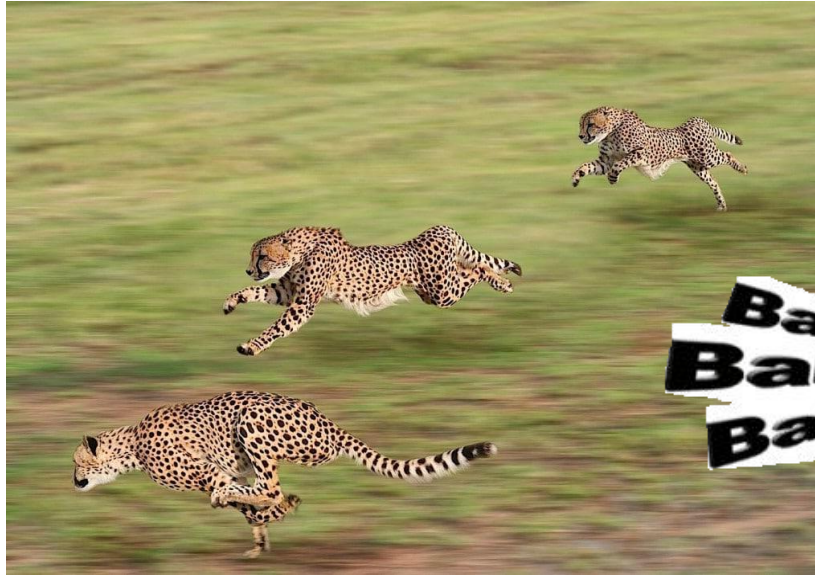
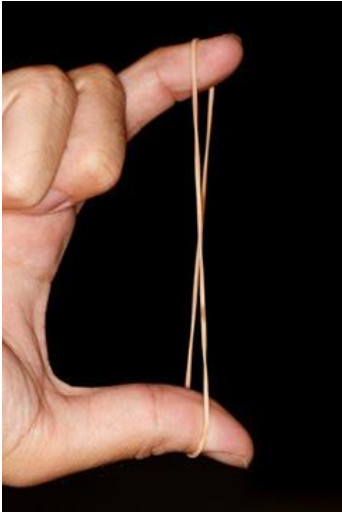
Nuclear energy is released in the form of heat and light when:

- 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?

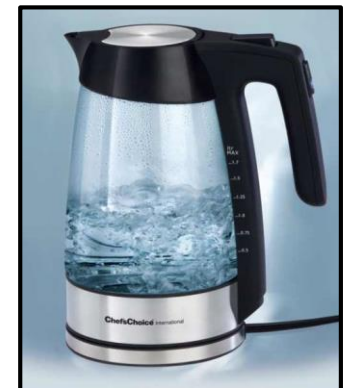
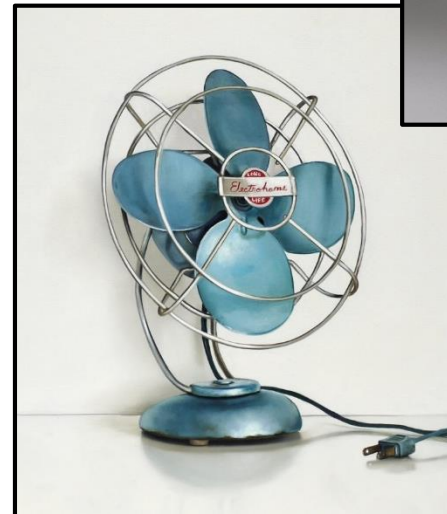


Law of Conservation of Energy

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.

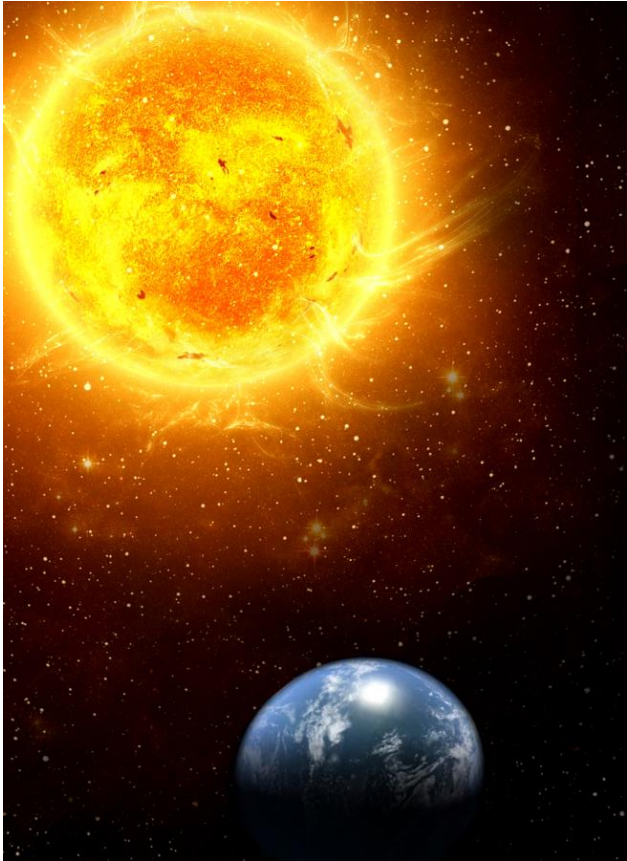


...and is converted into...



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...

