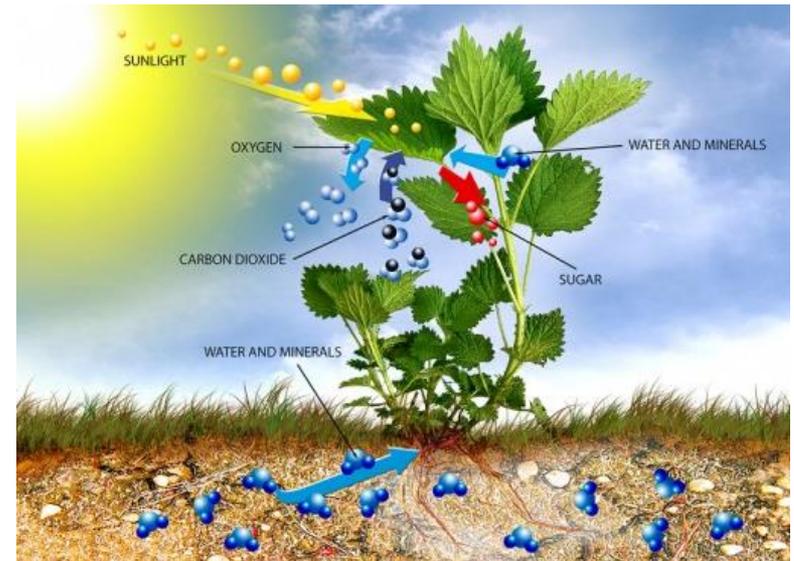


# Chemical Reaction Examples



**Combustion**: every time you strike a match, burn a candle, build a fire, or light a grill, you see the combustion reaction; it combines energetic molecules of fuel with oxygen to produce carbon dioxide and water.

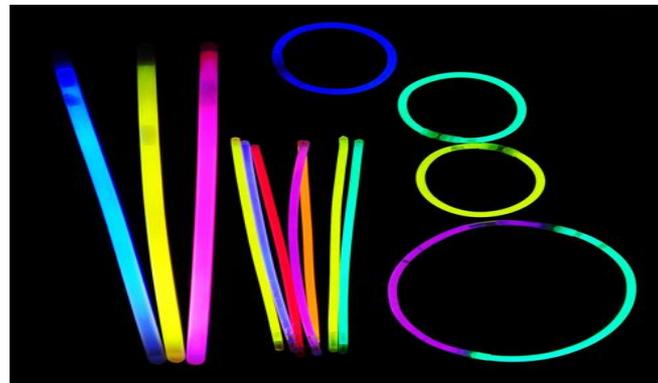


**Photosynthesis**: plants apply a chemical reaction called photosynthesis to convert carbon dioxide and water into food (glucose sugar) and oxygen.

# Chemical Reaction Examples



**Rust**: over time, iron develops a red, flaky coating called rust, which is an example of an **oxidation reaction**.



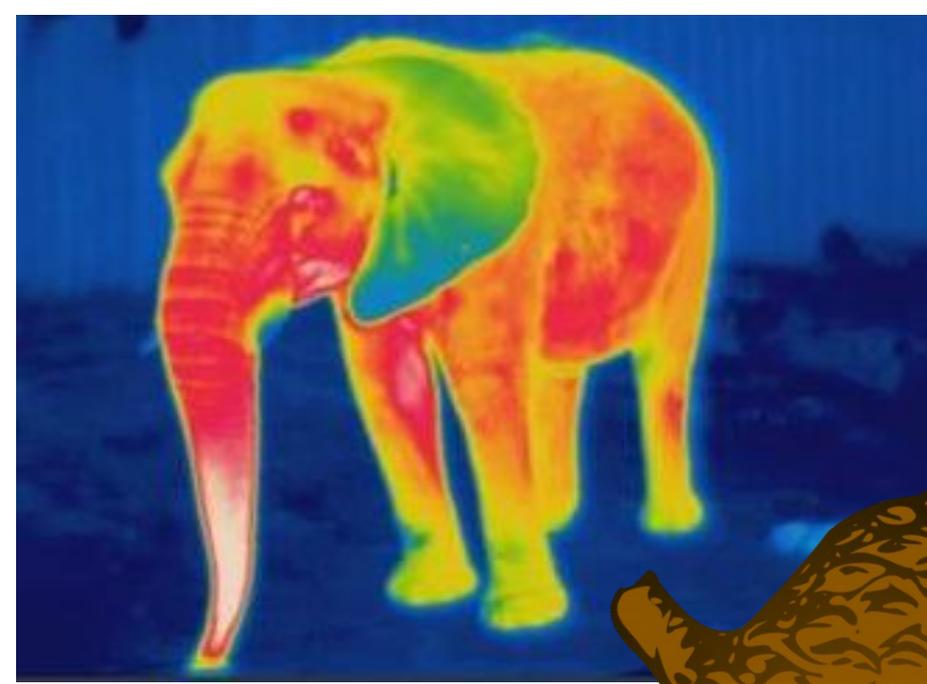
**Glow stick** is a plastic tube with a glass vial inside. When you bend it, the glass vial breaks allowing the chemicals that were inside the glass to mix with the chemicals in the plastic tube. Once these substances combine, a **light-releasing reaction** starts taking place.

# Chemical Reaction Examples

Cleaning with soap:  
soap emulsifies grime,  
which means **oily stains**  
**bind to the soap** so they can  
be lifted away with water.



Boiling the egg: when you use **high heat** to boil an egg, it causes a chemical reaction between the yolk and the white that leaves a green film around the yolk. That film is iron sulfide, caused by **iron** in the yolk reacting with **hydrogen sulfide** in the white (it won't hurt you to eat it, and the egg will taste the same).



**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

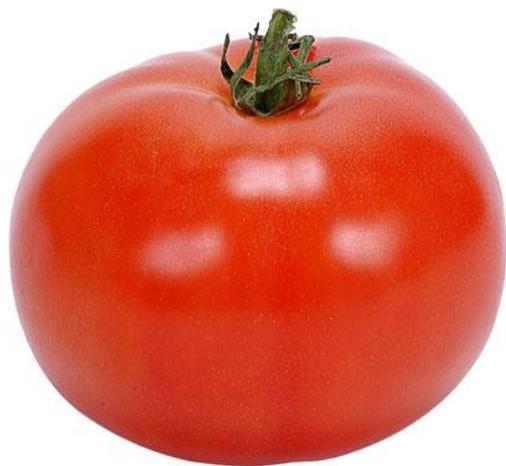
Energy due to an object's **motion** or **position**.  
(kinetic) (potential)



# 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

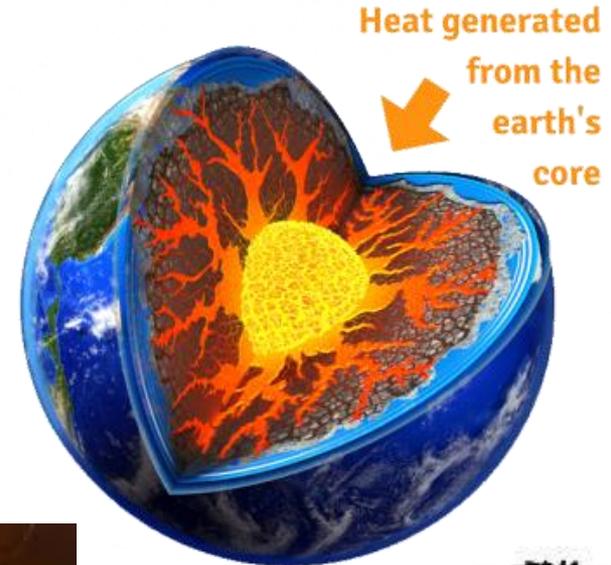
Electrical (from electric fields), Magnetic (from magnetic fields),  
Radiant (from electromagnetic radiation including *light*)



# 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.

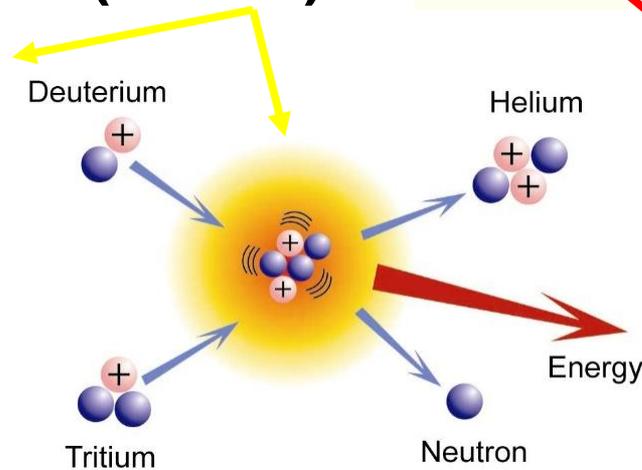
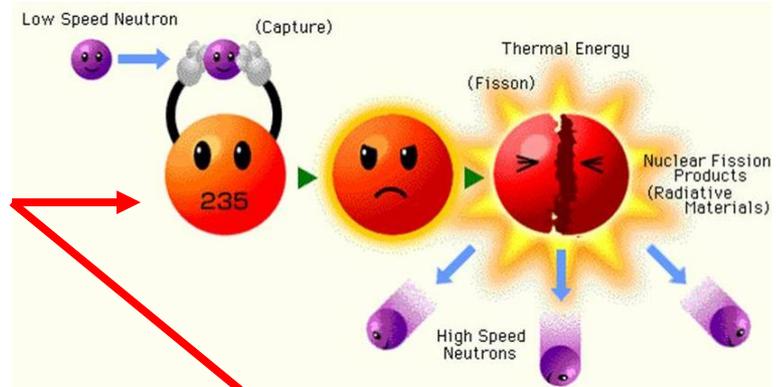


# Nuclear Energy

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**).



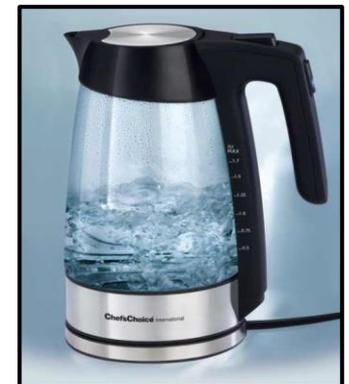
Nuclear energy is the **most concentrated** form of energy.

# 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.

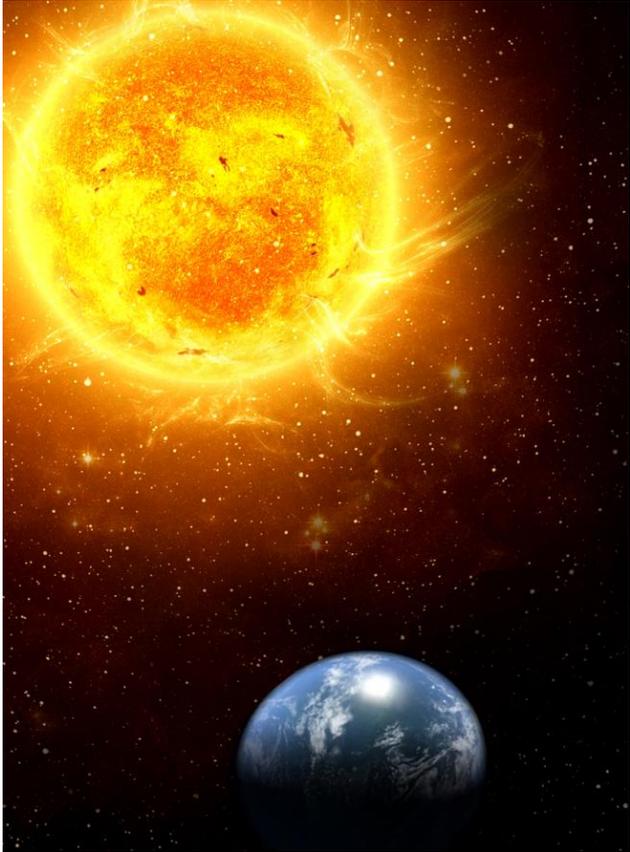


...and is converted into...



**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...



# What type of energy?

