Chapter 2, THE POWER OF ENERGY

-Energy is the capacity to do work or produce change. The unit of measurement of energy we use is the Joule (J)

-Forms of Energy...

- Give an example for each:

Solar Sun	Elastic spring	Electrical power station
Thermal heater	Radiant (light) light bulb	Chemical battery or human cells
Mechanical gears, bike	Wind wind	Sound Alarm
Hydraulic Waterfall (water)	Nuclear Atom's nucleus	

- **Thermal Energy** is energy that comes from the random motion of the particles that make up a substance.
- **Radiant Energy (light)** is contained and transported in electromagnetic waves (shorter wavelength → greater energy)
- **Chemical Energy** is stored in the bonds of a molecule.
- **Mechanical Energy** is the speed and mass of an object in its surroundings.

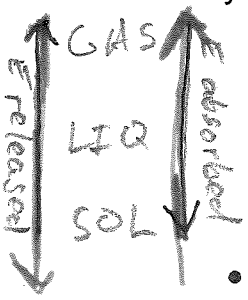
-Energy Transformation means a change of FORM.

- Example, a baseball pitcher: The chemical energy in the muscles of the pitcher's body is **transformed** into mechanical energy in the movement of his/her body.

-Energy Transfer is the same but a different PLACE or OBJECT

- Example 1, the same baseball pitcher: The mecanical energy in the movement of his/her body is **transferred** to the ball that is thrown.
- Example 2: The thermal energy (heat) from a stove is **transferred** to the pot of water heating up to a boil.

-Physical Changes (phase change)



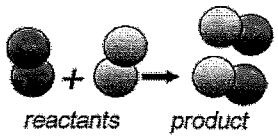
Fusion (melting) is solid to liquid and energy is ~~released~~ abs.	Sublimation is solid to gas and energy is ~~released~~ abs.	Evaporation is liquid to gas and energy is ~~released~~ abs.
Condensation is gas to liquid and energy is ~~absorbed~~ released	Deposition is gas to solid and energy is ~~absorbed~~ released	Solidification is liquid to ~~gas~~ solid and energy is ~~absorbed~~ released

- **Dissolution** is the creation of a solution by a solute dissolving in a solvent.
  - Some ~~solvents~~ solute need energy to be dissolved into a solvent, other ~~solvents~~ solutes release energy when dissolved. When dissolution releases E, temperature ↑. When dissolution absorbs E, temperature ↓.

- **Deformation** means changing the shape of a material.

-**Chemical Changes** changes the molecules and characteristic properties of matter.

- **Synthesis** reactions(like photosynthesis) make complex molecules from atoms or simpler molecules. These reactions usually absorb energy but can also sometimes release energy.
- **Decomposition** makes simpler molecules or atoms from more complex molecules (breaks them apart). These reactions usually release energy.



- **Oxidation** (ex: rusting metal) is a chemical reaction involving oxygen.
- Precipitation is the formation of a solid following the mixing of two solutions. (Ex: vinegar mixed with milk causes solid curds to form).

-Chemical Equations

- The total # of atoms from each element need to be the same in the reactants as in the products (Rule of conservation of mass)

Reactants Products

Ex: $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$ see if this obeys the Rule. Yes

C: 6 C: 6 H: 12
H: 12
O: 6+12 → O: 12+6

-Electromagnetic Spectrum

- Radio, Microwave, I.R, Visible light, U-V, X-Ray, Gamma
  Longest wavelength. (least E)
  R, O, Y, G, B, V
  Shortest wavelength (Most E)