

Temperature

- What is temperature?

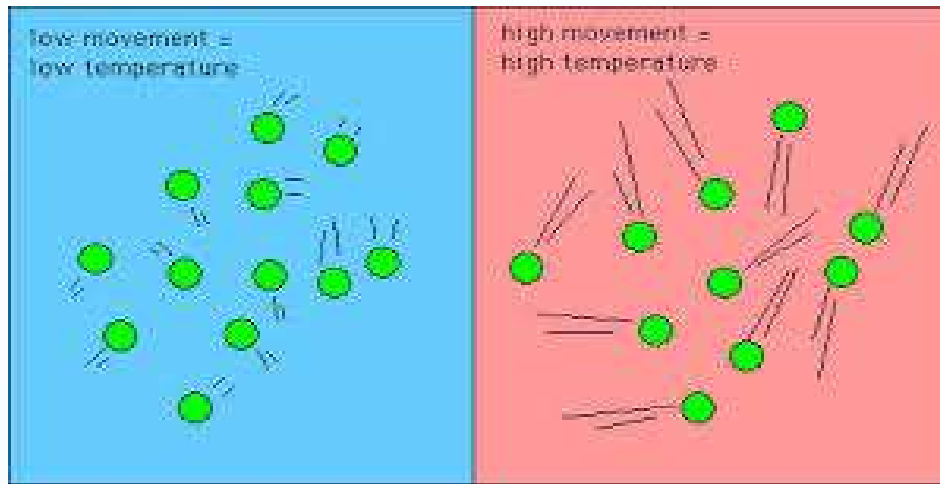
Temperature is the measure of the average energy of motion of particles in matter. When the particles in the air move more slowly, they have less thermal energy.

- How do we measure temperature?

A thermometer is used to measure temperature.

Temperature

❖ Kinetic Energy- the energy of particles in motion



Temperature Conversion Equations:

Fahrenheit to Celsius $\rightarrow ^\circ\text{C} = (5/9)(^\circ\text{F} - 32)$

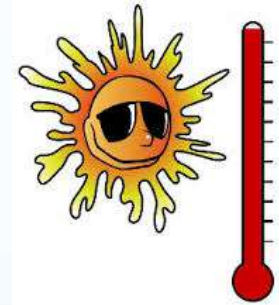
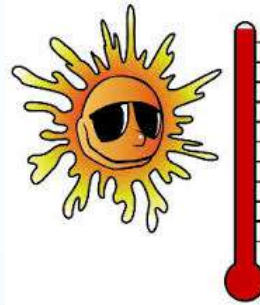
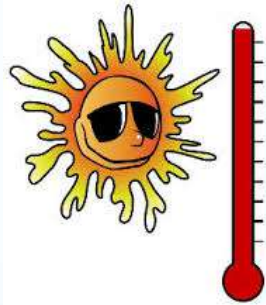
Celsius to Fahrenheit $\rightarrow ^\circ\text{F} = (9/5)^\circ\text{C} + 32$

Celsius to Kelvin $\rightarrow \text{K} = ^\circ\text{C} + 273$

- Freezing Point of water = 0°C , 32°F , 273 K
- Boiling Point of water = 100°C , 212°F , 373 K

Thermal Energy

- The sum of the kinetic and potential energy of all the molecules in an object.
- Heat- the transfer of thermal energy from one object to another when the objects are at different temperatures.



- ** Thermal Energy is always transferred from a warmer to a cooler object!!
(Give me some examples of you experiencing this in everyday life)

Transfer of Heat

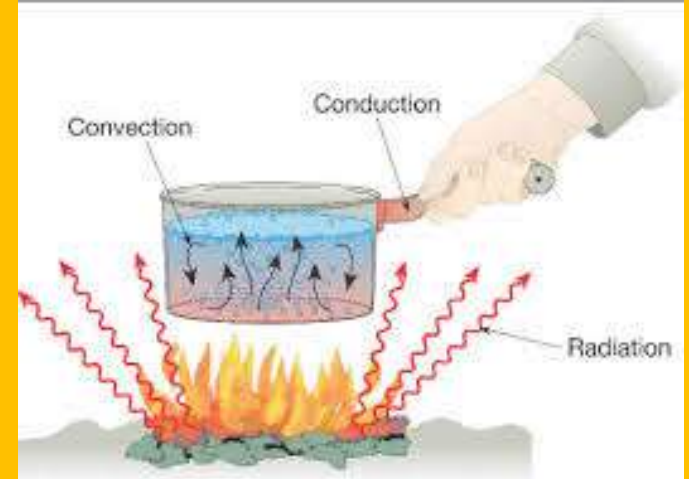
1. Conduction- particles in a material collide.

- Occurs in solids and liquids

2. Convection- warm air rising, cold air sinking

- Occurs in gasses and liquids

3. Radiation- Energy transferred in electromagnetic waves.



Exothermic and Endothermic

- Thermal Energy is a necessity in ALL Chemical reactions!!!
- All chemical reactions involve bond breaking and bond forming.
- Energy is needed to break bonds and released when bonds are formed.

Exothermic and Endothermic

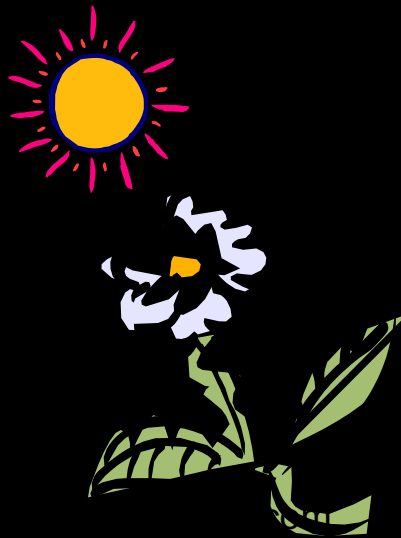
- A reaction in which heat is given out is exothermic.
- A reaction in which heat is taken in is endothermic.

Exothermic reaction, heat given off & temperature of substance rises

Endothermic reaction, heat taken in & temperature of the substance drops

Endothermic process: a change (e.g. a chemical reaction) that requires (or absorbs) heat.

Photosynthesis is an endothermic reaction (requires energy input from sun)



EXOTHERMIC & ENDOTHERMIC REACTIONS

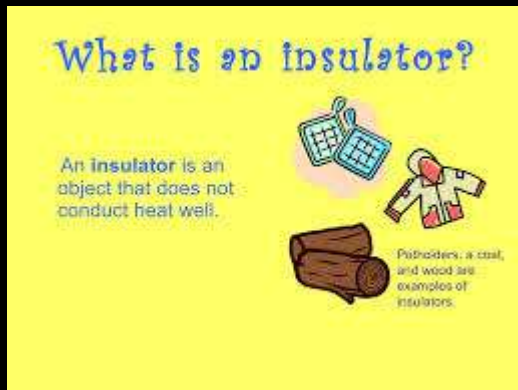
Exothermic process: a change (e.g. a chemical reaction) that releases heat.



Insulator vs. Conductor

Insulator

Any material in which thermal energy doesn't flow easily



Conductors

Any material that easily transfers thermal energy

Metal is a great conductor

