17.1 Notes - The Flow of Energy

Thermochemistry - study of changes in energy that occur during chemical reactions & changes in state.

Chemical potential energy - the energy stored in chemical bonds of a substance.

* Every substance has a certain amount of energy stored inside it *
  - determined by kinds of atoms & arrangement of atoms

Energy has no mass or volume and is only detected by its effects.

Energy changes occur as either heat transfer or work, or a combination of both.

Heat (q) - energy that transfers from one object to another because of a temperature difference between the objects
  * heat flows from warmer objects to cooler objects until they equalize

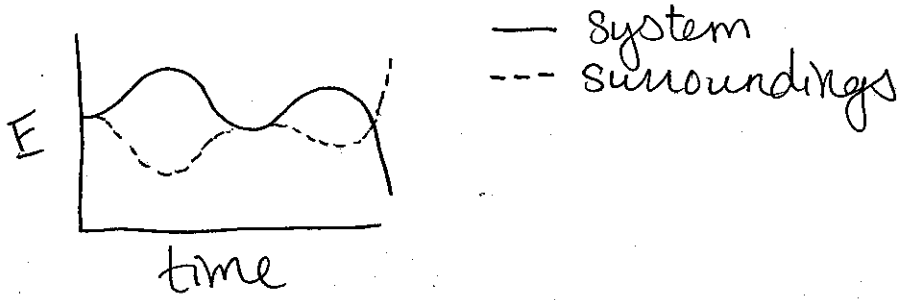
Chemical reactions & changes in state generally involve the absorption or release of heat.

System - a defined part of the universe on which you focus your attention

Surroundings - everything else in the universe

Law of conservation of energy - in any chemical or physical process, energy is neither created nor destroyed.

* If energy in a system increases, the energy of the surroundings must decrease by the same amount



Endothermic Process - heat absorbed into the system from the surroundings (defined as positive) q+

Exothermic process - heat is released from the system into the surroundings (defined as neg) q-

Heat flow is measured using the calorie & the joule. 1 calorie is the quanity of heat needed to raise the temperature of 1 g of water by 1°C.

- 1 Calorie (C) = 1 kilocalorie (kc) = 1000 calories (c)

1 joule (J) of heat raises the temperature of 1 g of water 0.2390°C.

- 1 J = 0.2390 cal // OR // 4.184 J = 1 cal

Heat capacity - the amount of heat needed to increase the temperature of an object exactly 1°C.

Heat capacity depends on mass & chemical composition.

↑ mass = ↑ heat capacity

(5 g) H_2O heat capacity ≠ (5 g) CO_2 heat capacity

Specific heat capacity (specific heat) – the amount of heat it takes to raise the temperature of 1 g of the substance by 1°C.

$$C = \frac{q}{m \times \Delta T} = \frac{\text{heat (J or cal)}}{\text{mass (g)} \times \text{change in temp (°C)}}$$

units for C = J/g°C or cal/g°C