# THERMOCHEMISTRY

Thermochemistry is the branch of physical chemistry which deals with the thermal or heat changes caused by chemical reactions.



#### Heat Capacity (Ms)

The amount of heat required to raise the temperature by 1°C or 1K of a given amount of a substance. Its unit is Joule per Kelvin

Total heat given to increase the temperature by  $\Delta t$ .

q=ms∆t

### **Molar Heat Capacity (Cm)**

The amount of heat required to raise the temperature by 1, C of 1 mole of a substance.

#### CLASSIFICATION OF MOLAR HEAT CAPACTLY

- 1. Molar heat capacity at constant pressure (Cp)
- 2. Molar heat capacity at constant volume (Cv)

#### RELATION BETWEEN Cp AND Cv

 $C_p - C_v = R$  (Mayor's formula)

 $C_p.C_v = \gamma$  (Poison's Ratio)

### Intensive Property

The property which does not depend upon the mass of substance is called intensive property, e.g. density, refractive index, specific heat, etc.

## **Extensive Property**

Mass dependent properties are called extensive properties. e.g.  $\Delta H$ ,  $\Delta S$ ,  $\Delta G$ , V, U, Resistance, Number of moles etc.

- 1. Two extensive property can be added
- 2. Ratio of two extensive properties is Intensive.
- 3. Intensive properties can not be added directly.

#### **Heat of Formation**

Enthalpy change during the formation of 1 mole of a compound from its most stable common occurring form (also called reference state) of elements is called heat of formation.  $C_{(s)} + O_{2(g)} \longrightarrow CO_{2(g)}$   $\Delta H = \Delta H_r(CO_2)$ 

# **Heat of Combustion**

It is the enthalpy change (always negative) when one mole of the substance undergo complete combustion.

 $C_{(5)}+O_2 \rightarrow CO_2(g)$ 

 $\Delta H^{\circ} = \Delta Hr^{\circ}(CO_2)$ 

#### **Heat of Atomisation**

When one mole of any substance is converted into gaseous atoms enthalpy change during the process is called heat of atomisation. It is always positive.