

class - B.Sc semester IIIrd

subject - physical chemistry.

Topic Name: $\rightarrow$ enthalpy of a reaction

The change in internal energy (ΔE) is the heat change accompanying a chemical reaction at constant volume because no external work is performed.

However at constant pressure not only does the change in internal energy take place but work is also involved because of expansion. ~~at~~ In the laboratory most of the chemical reactions are carried out at constant pressure rather than at constant volume. In order to ~~study~~ study the heat changes for reactions taking place at constant pressure and constant temperature chemists have introduced a new term called enthalpy.

The enthalpy of a system is defined as the sum of the internal energy and the product of its pressure and volume. that is

$$H = E + pV$$

where E is the internal energy, p is the pressure and V is the volume of system. It is called Heat content. However a change in enthalpy (ΔH) accompanying a process can be measured accurately and is given by the expression

$$\begin{aligned}\Delta H &= H - H \\ &= H_p - H_r.\end{aligned}$$

$$\Delta H = \Delta E + p \times \Delta V.$$

P.T.O.

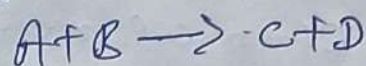
Page ②: Therefore, while the heat change in a process is equal to its change in internal energy ΔE at constant volume. It gives at constant pressure the enthalpy change ΔH . That is

ΔE = Heat change in a reaction at constant volume.

ΔH = Heat change in a reaction at constant pressure.

Exothermic and endothermic reactions.

Let us consider a general reaction at constant pressure.



If H_A, H_B, H_C and H_D be the enthalpies of A, B, C and D respectively, the heat of reaction at constant pressure viz. ΔH is equal to the difference in enthalpies of the products and the reactants.

$$\Delta H = H_{\text{products}} - H_{\text{reactants}}.$$

$$= (H_C + H_D) - (H_A + H_B)$$

The value of ΔH may be either zero, negative or positive. When ΔH is zero, the enthalpies of the products and reactants being the same, the heat is evolved or absorbed. In case ΔH is negative, the sum of enthalpies of the products is less than that of the reactants and the difference in enthalpy is given out in the form of heat.