* Bond, Dissociation Energy :—

Dissociation energy — The amount of energy required to separate an atom by breaking a bond with another atom in a given compound is called the dissociation energy. It is denoted by Q_D.
It is dependent on the nature of the atoms united by the bond as well as the nature of the molecule as a whole.

Bond energy — The average value of the dissociation energies of a given bond in a series of different dissociating species is called the Bond energy or Bond enthalpy. It is denoted by Q_B

Again, the dissociation energy as well as the bond energy of C—H bond in CH_4 and the same of C—H bond in C_6H_6 are different.

In the case of a diatomic molecule, however the bond energy and dissociation energy of a given bond must be the same. Such as, $H_2(g) \longrightarrow 2H(g)$

Eg. in the H_2O molecule —

$$H_2O\,(g) \longrightarrow H\,(g) + OH\,(g)$$

$$\vartheta_D' = \Delta H^\circ = 501.9 \text{ KJ/mole}$$

$$OH\,(g) \longrightarrow O\,(g) + H\,(g)$$

$$\vartheta_D'' = \Delta H^\circ = 423.4 \text{ KJ/mole}$$

ie. Dissociation energies (ϑ_D) of the O – H bond in H_2O molecule is found as above thus, the bond energy of the same is

$$\vartheta_B = \frac{501.9 + 423.4}{2} \text{ KJ/mole}$$

$$\therefore \vartheta_B = 462.6 \text{ KJ/mole.}$$ #

Heat of Atomisation :—

The standard state of an element is the state in which the element exists at 25°c (ie 298°K) and at 1 atm. The quantity of heat required to produce one mole of atoms in the gaseous atomic state from the element in the standard state is called the heat of atomisation of the element.

The heat of atomisation of the elements are determined from spectroscopic measurements and some thermal data.

The most important, yet most difficult and uncertain is the det^n of the heat of atomisation of carbon. The procedure follows —

(1) $C(gr) + O_2(g) \longrightarrow CO_2(g)$; $\Delta H_1 = -94.2$ K.Cal

(2) $CO(g) + \frac{1}{2}O_2(g) \longrightarrow CO_2(g)$; $\Delta H_2 = -67.7$ K.Cal.

(3) $\frac{1}{2}O_2(g) \longrightarrow O(g)$; $\Delta H_3 = 58.7$ KCal

(4) $CO(g) + \longrightarrow C(g) + O(g)$; $\Delta H_4 = 256.5$ KCal

(5) $C(gr) \longrightarrow C(g)$; $\Delta H_5 = ?$ (heat of atomisation)

The first two values (1) & (2) are obtained calorimetrically and (3) & (4) are determined spectroscopically. Obviously, the of atomisation of graphite,

$\Delta H_5 = \Delta H_1 - \Delta H_2 - \Delta H_3 + \Delta H_4$

i.e. $\Delta H_5 = 171.3$ K.Cal. **