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Class ⇒ B.Sc. Part-1 subsidiary
subject ⇒ Chemistry
Chapter ⇒ Thermochemistry
Topic ⇒ Bond Energy

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Bond Energy

The average amount of energy required to break or dissociate one mole of bonds of that type present in the compound is called **Bond energy** or **Bond enthalpy**.

Bond energy is expressed in $KCal\,mol^{-1}$ or $KJ\,mol^{-1}$.

e.g. Bond energy of H-H bond is $433\,KJ\,mol^{-1}$ or $103.58\,KCal\,mol^{-1}$.

Bond	Bond energy
Cl-Cl	$243\,KJ\,mol^{-1}$
O=O	$499.0\,KJ\,mol^{-1}$
C-H	$414.0\,KJ\,mol^{-1}$

For diatomic molecules (like H_2, HCl), the bond energy is equal to the dissociation energy of the molecules but for a polyatomic molecule like CH_4 the bond dissociation energy are different.

Bond energy is a measure of strength of the bond. In otherwords, bond energy is the force with which the atoms are bond together.

Bond energy depends upon

(i) Size of the atom

Applications of Bond Energies

1. Determination of enthalpies of Reactions ⇒

The bond energies is used for determining ~~enthalpies~~ ~~anthal~~ enthalpies of reactions.

e.g.

$$H_2C = CH_2 + H_2 \longrightarrow CH_3 - CH_3$$

In this rek^n, the four C–H bonds of C_2H_4 remain unaffected. A double bond breaks in ethylene and an H–H bond breaks in H_2. In turn, one C–C bond and two C–H bonds are formed in C_2H_6. Thus

$$\Delta H = -\Delta H_{C-C} - 2\Delta H_{C-H} + \Delta H_{C=C} + \Delta H_{H-H}$$

Substituting the bond energies values. we get

$$\Delta H = -(347.3 + 832.4) + (615.0 + 435.1)$$
$$= -129.6 \text{ KJ}$$

This value is quite close to the experimental value of −133 KJ.

2. Determination of enthalpies of formation of compounds.

3. Determination of resonance energy.

* When a bond is broken, the bond energy is positive because heat is absorbed. It is written with a minus sign when a bond is formed and heat is evolved.

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