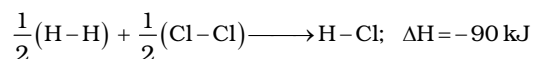


**46.(D)**  $\Delta H \neq \Delta E$  for  $\text{CO(g)} + \frac{1}{2}\text{O}_2\text{(g)} \longrightarrow \text{CO}_2\text{(g)}$  because  $\Delta n_g \neq 0$

**47.(A)** The amount of heat evolved or absorbed in the formation of one mole of product from its elements.

So, the correct answer is  $\text{C} + \text{O}_2\text{(1 atm)} \longrightarrow \text{CO}_2\text{(1 atm)}$ .

**48.(D)** The formation of one mole of HCl can be represented as,



Hence, for the reaction,

Heat evolved = heat evolved in bond formation – heat required for bond breaking

$$\therefore 90 \text{ KJ} = [\text{H}-\text{Cl bond energy}] - \left( \frac{1}{2} \times 430 + \frac{1}{2} \times 240 \right)$$

$$\therefore (\text{H}-\text{Cl bond energy}) = 90 + (215 + 120) = 425 \text{ kJ mol}^{-1}$$

**49.(D)** Formation of XY is known as :  $\frac{1}{2}\text{X}_2 + \frac{1}{2}\text{Y}_2 \longrightarrow \text{XY}$

$$\Delta H = (\text{BE})_{\text{X}-\text{X}} + (\text{BE})_{\text{Y}-\text{Y}} - 2(\text{BE})_{\text{X}-\text{Y}}$$

If (BE) of X–Y = a

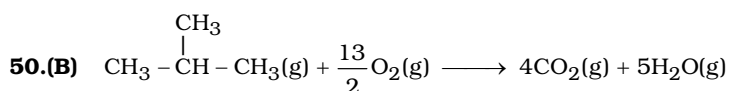
Then (BE) of (X – X) = a

$$\text{And (BE) of (Y–Y)} = \frac{a}{2}$$

$$\therefore \Delta H_f(\text{X–Y}) = -200 \text{ kJ} \quad \therefore -400 (\text{for 2 mol XY}) = a + \frac{a}{2} - 2a$$

$$\Rightarrow -400 = -\frac{a}{2} \Rightarrow a = +800 \text{ kJ}$$

The bond dissociation energy of  $\text{X}_2 = 800 \text{ kJ mol}^{-1}$ .

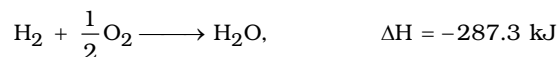
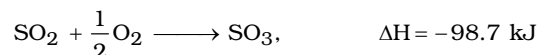
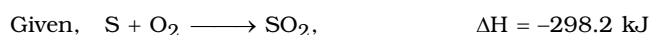
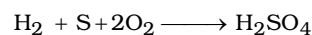


$$\Delta H = \Delta E + \Delta nRT$$

$\Delta n$  = mole of (gaseous products – gaseous reactants) = +ve

Thus,  $\Delta H > \Delta E$

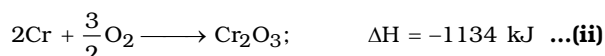
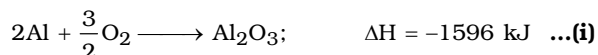
**51.(A)** Enthalpy of formation of  $\text{H}_2\text{SO}_4$  can be represented by the following equation:



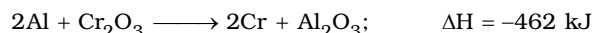
On adding all the four equations, we get the equation (i),

$$\text{Hence, } \Delta H_f = (-298.2) + (-98.7) + (-130.2) + (-287.3) = -814.4 \text{ kJ}$$

**52.(B)** According to question,



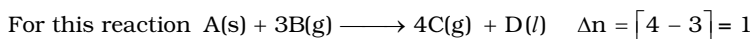
Reversing Equation (ii) and adding both reactions, we get :



**53.(C)**  $\text{CH}_4$  has four C – H bonds. So,  $4 \times 416 \text{ kJ}$  is required to break  $\text{CH}_4$  into C and 4H.

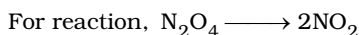
**54.(C)** We know,  $\Delta H = \Delta U + \Delta nRT$

$$\Delta n = [\text{total number of moles of gaseous products}] - [\text{Total number of moles of gaseous reactants}]$$



$$\Delta H = \Delta U + RT$$

**55.(D)** We know that,  $\Delta H = \Delta E + \Delta n_g RT$



$$\Delta n_g = 2 - 1 = 1$$

$$\therefore \Delta H = \Delta E + RT \quad \text{or} \quad \Delta H > \Delta E$$

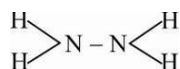
**56.(B)**  $\Delta H = \Delta E + p\Delta V = \Delta E + n_g RT$



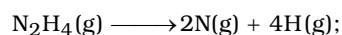
$$\Delta n_g = n_{(\text{p})\text{g}} - n_{(\text{r})\text{g}} = 2 - 1 = 1$$

$$\therefore \Delta H = \Delta E + 1 \times RT \quad \therefore \Delta H > \Delta E$$

**57.(B)** The structure of  $\text{N}_2\text{H}_4$  is as follows



Hence, in the reaction,



$$\Delta H = (\text{N-N bond energy}) + (\text{N-H bond energy} \times 4)$$

$$\therefore \text{N-N bond energy} = 1724 - 1564 = 160 \text{ kJ/mol}$$

**58.(C)** The amount of heat either evolved or absorbed when one gram mole of a substance is formed from its constituent elements, is known as the standard heat of formation ( $\Delta H_f^\circ$ ).

For standard state temperature is  $25^\circ\text{C}$  or  $298 \text{ K}$  and pressure of gaseous substance is one atmosphere.

**59.(A)** Heat of decomposition of water is  $\text{H}_2\text{O}(\text{g}) \longrightarrow \text{H}_2(\text{g}) + \frac{1}{2}\text{O}_2(\text{g}) \quad \Delta H = \frac{+573.2}{2} = 286.6 \text{ kJ/mol}$

**60.(D)** Bond energy O – H bond =  $109 \text{ kcal/mol}$

$$\therefore \text{Energy absorbed in the dissociation of 1 mol of water } (\text{H}_2\text{O}) = 2 \times 109 = 218 \text{ kcal}$$

$$\therefore \text{Energy released in the formation of 1 mole of water} = 218 \text{ kcal.}$$