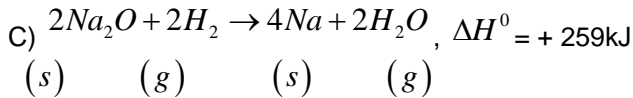
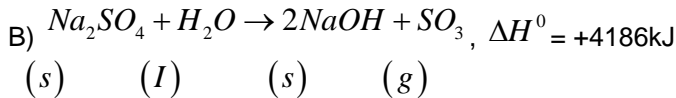
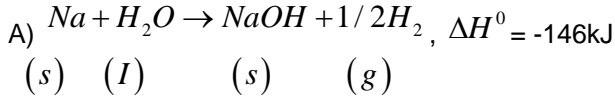


8. THERMODYNAMICS

PREVIOUS EAMCET BITS

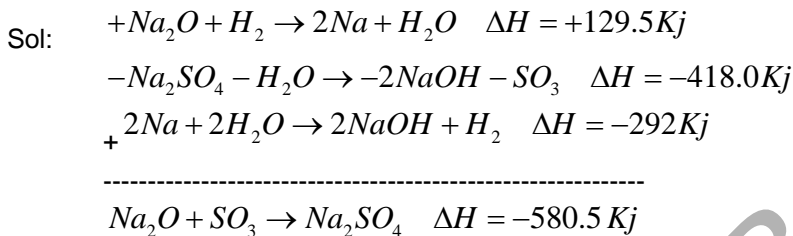
1. Calculate ΔH^0 for the reaction : $Na_2O + SO_3 \rightarrow Na_2SO_4$ given the following
(s) (g) (g)

(2009 E)



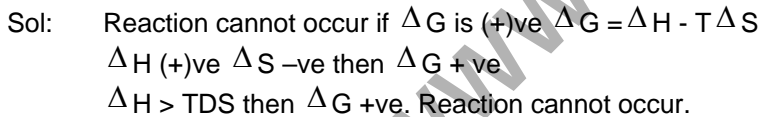
- 1) +823 kJ 2) -581 kJ 3) -435 kJ 4) +531 kJ

Ans : 2

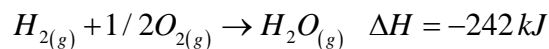
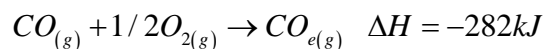
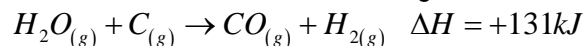


2. A chemical reaction cannot occur at all if its (2009 M)
 1) ΔH is (+) ve and ΔS is (-) ve 2) ΔH is (-) ve and ΔS is (+) ve
 3) ΔH and ΔS are (+)ve but $\Delta H > T \Delta S$ 4) ΔH and ΔS are (-)ve but $\Delta H > T \Delta S$

Ans : 1,3



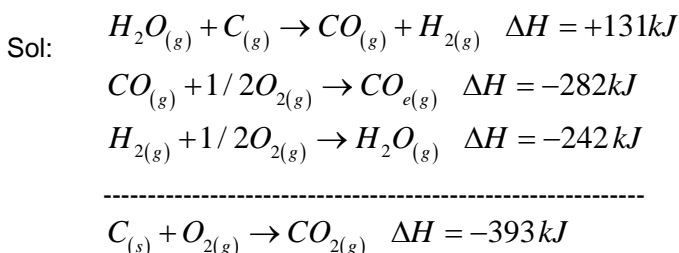
3. Calculate ΔH in kJ for the following reaction $C_{(s)} + O_2(g) \rightarrow CO_2(g)$ Given that,



(2008 E)

- 1) -393 2) +393 3) +655 4) -655

Ans : 1

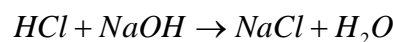
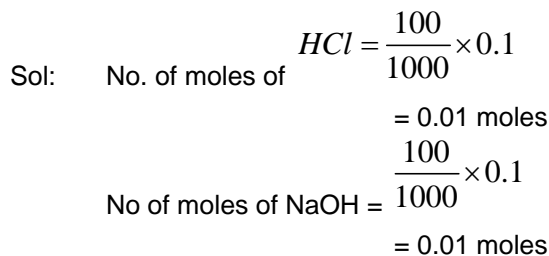


4. 100cm^3 of 0.1M HCl and 100cm^3 of 0.1M NaOH solutions are mixed in a calorimeter. If the heat liberated is "Q" kcal, the heat of neutralization (ΔH) (in kcal) of $\text{HCl}_{(aq)}$ and $\text{NaOH}_{(aq)}$ is

(2008 M)

- 1) 10 Q 2) -100 Q 3) -1000 Q 4) -Q

Ans : 2

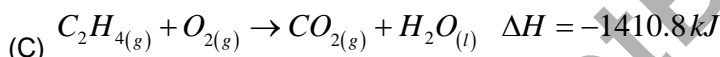
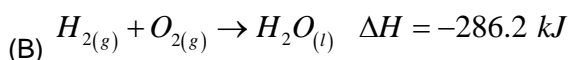
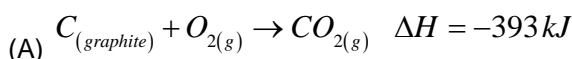


0.01 mole 0.01 mole

Heat liberated QKcal

 $\therefore \Delta H = -100 \text{ QKcal}$

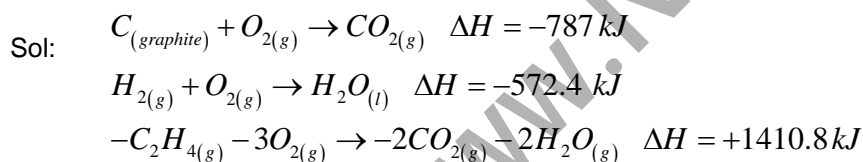
5. Calculate enthalpy for formation of ethylene from the following data



(2007 E)

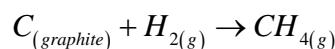
- 1) 54.1 kJ 2) 44.8 kJ 3) 51.4 kJ 4) 48.4 kJ

Ans : 3



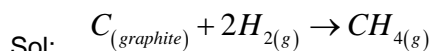
6. Calculate the difference between ΔE and ΔH for the following reaction at 27°C (in. K.cal)

(2007 M)



- 1) -0.6 2) -1.2 3) +0.6 4) +1.2

Ans : 3



$$\Delta n = 1 - 2 = -1$$

$$\Delta H = \Delta E + \Delta n RT$$

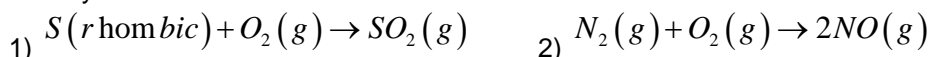
$$\Delta E - \Delta H = -\Delta n RT$$

$$= -(-1) 2 \times 300 = 600 \text{ cal}$$

$$= +0.6 \text{ k cal}$$

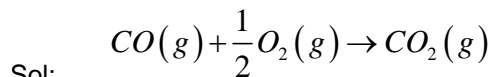
7. Identify the reaction for which $\Delta H \neq \Delta E$

(2006 E)





Ans : 4



$$\Delta n = -\frac{1}{2}$$

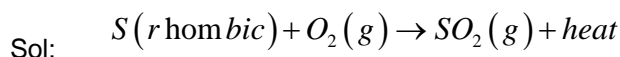
$$\therefore \Delta H \neq \Delta E$$

8. Identify the reaction in which the heat liberated corresponds to the heat of formation (ΔH)

(2006 M)

- 1) $C(\text{diamond}) + O_2(g) \rightarrow CO_2(g) + \text{heat}$
- 2) $2H_2(g) + O_2(g) \rightarrow 2H_2O(g) + \text{heat}$
- 3) $C(\text{diamond}) + 2H_2(g) \rightarrow CH_4(g) + \text{heat}$
- 4) $S(\text{rhom bic}) + O_2(g) \rightarrow SO_2(g) + \text{heat}$

Ans : 4



9. Which of the following is not correct

(2005 E)

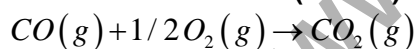
- 1) Dissolution of NH_4Cl in excess of water, is an endothermic process
- 2) Neutralisation process is always exothermic
- 3) The absolute value of enthalpy (H) can be determined experimentally
- 4) The heat of reaction at constant volume is denoted by ΔE

Ans : 3

Sol: The absolute value of enthalpy (H) can be determined experimentally

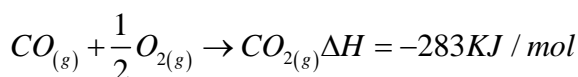
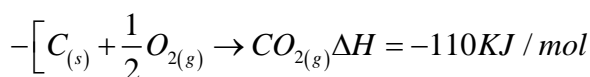
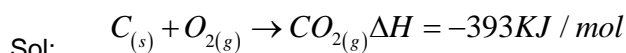
10. The heat of formation of $CO(g)$ and $CO_2(g)$ are $\Delta H = -110$ and $\Delta H = -393$ kJ.mol^{-1} respectively. What is the heat of reaction (ΔH) (in kJ mol^{-1}) for the following reaction?

(2005 M)



- 1) - 504 2) -142.5 3) -283 4) 504

Ans . 3



11. Which of the following is endothermic reaction ?

(2004 E)

- 1) $N_2(g) + 3H_2(g) - 92 \text{kJ} \rightarrow 2NH_3(g)$
- 2) $N_2(g) + O_2(g) + 180.8 \text{kJ} \rightarrow 2NO(g)$
- 3) $H_2(g) + Cl_2(g) \rightarrow 2HCl(g) + 184.6 \text{kJ}$
- 4) $C(\text{graphite}) + 2H_2(g) \rightarrow CH_4(g) + 74.8 \text{kJ}$

Ans : 2

Sol: In an endothermic reaction heat energy is absorbed.

12. Which one of the following is an exothermic reaction ? (2004 M)

- 1) $N_2(g) + O_2(g) + 180.8kJ \rightarrow 2NO(g)$
- 2) $N_2(g) + 3H_2(g) - 92kJ \rightarrow 2NH_3(g)$
- 3) $C(\text{graphite}) + H_2O(g) \rightarrow CO(g) + H_2(g) - 131.4kJ$
- 4) $C(\text{graphite}) + 2S(s) \rightarrow CS_2(l) - 91.9kJ$

Ans : 2

Sol: In an exothermic reaction heat energy is absorbed

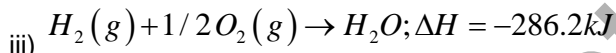
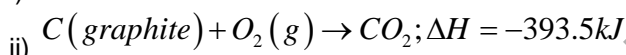
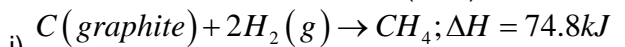
13. When 10 grams of methane is completely burnt in oxygen, the heat evolved is 560 kJ. What is the heat of combustion (in kJ. Mole-1) of methane ? [2003 E]

- 1) -1120
- 2) -968
- 3) -896
- 4) -560

Ans : 3

Sol: Heat of combustion of $CH_4 = \frac{560 \times 16}{10} = 896$ KJ

14. Calculate the heat of combustion (in kJ) of methane from the following data :



(2002 E)

- 1) -891.1
- 2) -816.3
- 3) -965.9
- 4) -1040.7

Ans : 1

Sol: Data given $\Delta H_{(f)} CH_4 = -74.8kJ$

$$\Delta H_{(f)} CO_2 = -393.5kJ ;$$

$$\Delta H_{(f)} H_2O = -286.2kJ$$

Combustion Reaction



$$\begin{aligned} \Delta H &= \left[\Delta H_{(f)} CO_2 + 2(\Delta H_{(f)} H_2O) \right] - \left[\Delta H_{(f)} CH_4 + 2(\Delta H_{(f)} O_2) \right] \\ &= \left[-393.5 + 2(-286.2) \right] - \left[-74.8 + 2 \times (0) \right] \\ \Delta H &= -393.5 - 572.4 + 74.8 \\ &= -891.1KJ \end{aligned}$$

15. Which one of the following is an example of exothermic reaction (2002 M)

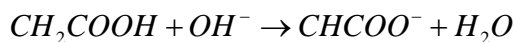
- 1) $H_{2(g)} + Cl_{2(g)} \rightarrow 2HCl_{(g)} \Delta H = -184.6KJ$
- 2) $N_{2(g)} + O_{2(g)} \rightarrow 2NO_{(g)} \Delta H = 180.8KJ$
- 3) $C_{(graphite)} + H_2O_{(g)} \rightarrow CO_{(g)} + H_{2(g)} \Delta H = +131.4KJ$
- 4) $C_{(graphite)} + 2S_{(s)} + 91.9KJ \rightarrow CS_{2(l)}$

Ans : 1

Sol: Negative sign for ΔH means exothermic reaction.

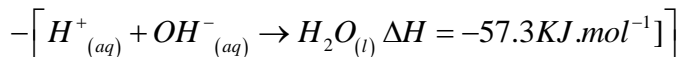
16. In the reaction $CH_2COOH_{(aq)} + OH_{(aq)} \rightarrow CH_3COO^- + H_2O_{(l)}$; $\Delta H = -55.2 kJ.mol^{-1}$ What is the heat of dissociation (in $kJ mol^{-1}$) of acetic acid? (2001 E)
- 1) +2.1 2) -57.3 3) -35.1 4) -176.1

Ans : 3

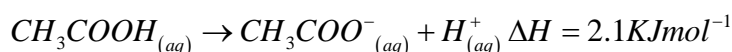
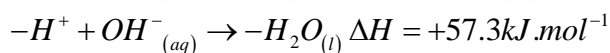
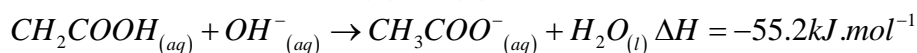
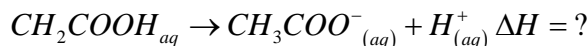


Sol: Date given (aq) (aq) (aq) (l)

$$\Delta H = -55.2 KJ.mol^{-1}$$



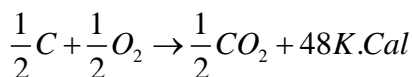
Problem



17. Heat of combustion of carbon is 96 Kcal. When some quantity of carbon is burnt in oxygen, 48 K cal of heat is liberated. What is the volume (in lit) of oxygen at STP reacted with this carbon [2000 M]
1. 48 2. 22.4 3. 11.2 4. 1

Ans : 3

Sol: $C + O_2 \rightarrow CO_2 + 96 K.Cal$



Half mole of O₂ required i.e, 11.2 lit, at S.T.P.

