

**DAILY PRACTICE PROBLEM
OF
PHYSICAL CHEMISTRY
FOR NEET**

**BY
JITENDRA HIRWANI**

THERMOCHEMISTRY

ETOOSINDIA
INDIA'S NO. 1 ONLINE COACHING

**Plot No. 38, Near Union Bank of India, Rajeev Gandhi Nagar,
Kota, Rajasthan – 324005 Mob. : 9214233303**

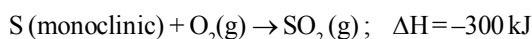
DPP- 1

1. If the heat of formation of NO_2 is 'x' [$\frac{1}{2} \text{N}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow \text{NO}_{2(\text{g})}$] the heat of reaction $\text{N}_{2(\text{g})} + \text{O}_{2(\text{g})} \rightarrow 2\text{NO}_{2(\text{g})}$ is y and the heat of reaction $2\text{NO}_{(\text{g})} + \text{O}_{2(\text{g})} \rightarrow 2\text{NO}_{2(\text{g})}$ is z, then

(1) $2x + z = y$ (2) $2y + z = x$ (3) $2x - z = y$ (4) $2z + x = y$

Ans. (3)

2. $\text{S}(\text{rhombic}) + \text{O}_2(\text{g}) \rightarrow \text{SO}_2(\text{g})$; $\Delta H = -297.5 \text{ kJ}$

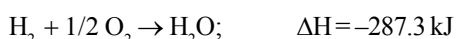
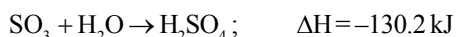
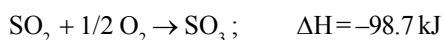


The above data can predict that

- (1) Rhombic sulphur is yellow in colour. (2) Monoclinic sulphur has metallic lustre
(3) Monoclinic sulphur is more stable (4) $\Delta H_{(\text{Transition})}$ of S (R) to S (M) is endothermic process.

Ans. (4)

3. $\text{S} + \text{O}_2 \rightarrow \text{SO}_2$; $\Delta H = -298.2 \text{ kJ}$



then the enthalpy of formation of H_2SO_4 at 298 K is

(1) -814.4 kJ (2) -650.3 kJ (3) -320.5 kJ (4) -433.5 kJ

Ans. (1)

4. When 1 g of anhydrous oxalic acid is burnt at 25°C , the amount of heat liberated is 2.835 kJ. ΔH combustion is (oxalic acid: $\text{C}_2\text{H}_2\text{O}_4$)

(1) -255.15 kJ (2) -445.65 kJ (3) -295.24 kJ (4) -155.16 kJ

Ans. (1)

5. Which one of the following is not applicable for a thermochemical equation :

- (1) It tells about physical state of reactants and products
(2) It tells whether the reaction is spontaneous
(3) It tells whether the reaction is exothermic or endothermic
(4) It tells about the allotropic form (if any) of the reactants

Ans. (2)

6. The enthalpy changes of formation of the gaseous oxide of nitrogen (N_2O and NO) are positive because of :

- (1) The high bond energy of the nitrogen molecule (2) The high electron affinity of oxygen atoms
(3) The high electron affinity of nitrogen atoms (4) The tendency of oxygen to form O^{2-}

Ans. (1)

7. Heat of formation, ΔH_f° of an explosive compound like NCl_3 is –

(1) Positive (2) Negative (3) Zero (4) Positive or negative

Ans. (1)

8. Enthalpy of a compound is equal to its :- (When it is formed from constituent particles)

(1) Heat of combustion (2) Heat of formation (3) Heat of reaction (4) Heat of solution

Ans. (2)

9. The enthalpy of formation of ammonia is $-46.0 \text{ KJ mol}^{-1}$. The enthalpy change for the reaction $2\text{NH}_3(\text{g}) \rightarrow \text{N}_2(\text{g}) + 3\text{H}_2(\text{g})$ is :

(1) 46.0 KJ mol^{-1} (2) 92.0 KJ mol^{-1} (3) $-23.0 \text{ KJ mol}^{-1}$ (4) $-92.0 \text{ KJ mol}^{-1}$

Ans. (2)

10. Standard enthalpy of formation is zero for .

(1) $\text{C}_{\text{diamond}}$ (2) $\text{Br}_{(\text{g})}$ (3) $\text{C}_{\text{graphite}}$ (4) $\text{O}_{3(\text{g})}$

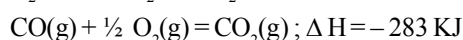
Ans. (3)

11. Given standard enthalpy of formation of CO (-110 KJ mol^{-1}) and CO_2 (-394 KJ mol^{-1}). The heat of combustion when one mole of graphite burns is

(1) -110 KJ (2) -284 KJ (3) -394 KJ (4) -504 KJ

Ans. (3)

12. The heat evolved during the combustion of 112 litre of water gas at STP (mixture of equal volume of H_2 and CO) is: Given



(1) 241.8 KJ (2) 283 KJ (3) 1312 KJ (4) 1586 KJ

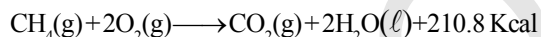
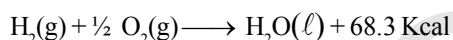
Ans. (3)

13. Heat of formation of CO_2 is -94.0 K. cal . What would be the quantity of heat liberated, when 3 g of graphite is burnt in excess of oxygen:-

(1) 23.5 K cal (2) 2.35 K cal (3) 94.0 K cal (4) 31.3 K cal

Ans. (1)

14. Given $\text{C}(\text{s}) + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + 94.2 \text{ Kcal}$

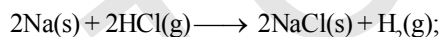


The heat of formation of methane in Kcal will be

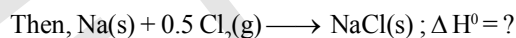
(1) -45.9 (2) -47.8 (3) -20.0 (4) -47.3

Ans. (3)

15. If, $\text{H}_2(\text{g}) + \text{Cl}_2(\text{g}) \rightarrow 2\text{HCl}(\text{g}); \Delta H^\circ = -44 \text{ Kcal}$



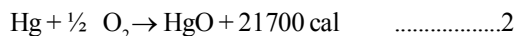
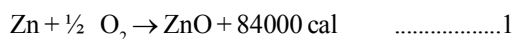
$\Delta H = -152 \text{ Kcal}$



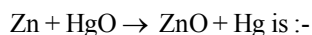
(1) 108 Kcal (2) 196 Kcal (3) -98 Kcal (4) 54 Kcal

Ans. (3)

16. Given that :



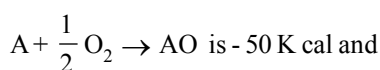
The heat of reaction (ΔH) for,



(1) 105700 cal (2) 62300 cal (3) -105700 cal (4) -62300 cal

Ans. (4)

17. The heat of reaction for

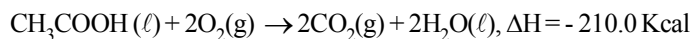
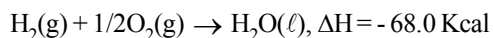
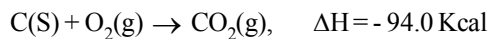


$AO + \frac{1}{2} O_2 \rightarrow AO_2$ is 100 Kcal. The heat of reaction for $A + O_2 \rightarrow AO_2$ is:-

- (1) - 50 K cal. (2) + 50 K cal. (3) 100 K cal. (4) 150 K cal.

Ans. (2)

18. Using the following thermochemical data:



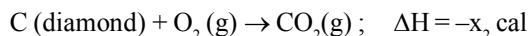
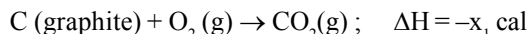
The heat of formation of acetic acid is:-

- (1) 116.0 Kcal (2) - 116.0 Kcal (3) - 114.0 Kcal (4) + 114.0 K cal

Ans. (3)

DPP - 2

1. Consider the following reaction :



What is the heat of transition of graphite into diamond ?

- (1) $x_1 + x_2$ (2) $x_2 - x_1$ (3) $x_1 - x_2$ (4) $x_1 x_2$

Ans. (2)

2. The heat of combustion of yellow P and red P are -9.91 kJ and -8.78 kJ respectively. The heat of transition of yellow to red phosphorus is

- (1) -18.69 kJ (2) $+1.13 \text{ kJ}$ (3) $+18.69 \text{ kJ}$ (4) -1.13 kJ

Ans. (4)

3. $\Delta H_f \text{ C}_2\text{H}_4 = 12.5 \text{ kcal}$

Heat of atomisation of C = 171 kcal

Bond energy of $\text{H}_2 = 104.3 \text{ kcal}$

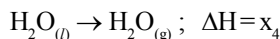
Bond energy of C – H = 99.3 kcal

What is C = C bond energy ?

- (1) 140.9 kcal (2) 49 kcal (3) 40 kcal (4) 76 kcal

Ans. (1)

4. $\text{H}_2(\text{g}) + \frac{1}{2} \text{O}_2(\text{g}) \longrightarrow \text{H}_2\text{O}(\ell)$



Given,

$$E_{\text{H-H}} = x_1$$

$$E_{\text{O=O}} = x_2$$

$$E_{\text{O-H}} = x_3$$

ΔH_f of H_2O vapour is

- (1) $x_1 + \frac{x_2}{2} - x_3 + x_4$ (2) $2x_3 - x_1 - \frac{x_2}{2} - x_4$ (3) $x_1 + \frac{x_2}{2} - 2x_3 - x_4$ (4) $x_1 + \frac{x_2}{2} - 2x_3 + x_4$

Ans. (4)

5. $\text{H}(\text{g}) + \text{O}(\text{g}) \rightarrow \text{O-H}(\text{g}); \quad \Delta H$ for this reaction is

- (1) Heat of formation of O – H (2) Bond energy of O – H
(3) Heat of combustion of H_2 (4) Zero at all temperatures

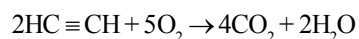
Ans. (2)

6. Energy required to dissociate 4 g of gaseous H_2 into free gaseous atoms is 872 kJ at 25°C . The bond energy of H–H bond will be

- (1) 8.72 kJ (2) 4.36 kJ (3) 436 kJ (4) 43.6 kJ

Ans. (3)

7. The enthalpy of reaction,

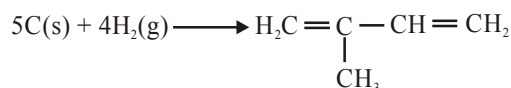


If the bond energies of C–H, $\text{C}\equiv\text{C}$, $\text{O}=\text{O}$, $\text{C}=\text{O}$ and O–H bonds are p, q, r, s, t respectively.

- (1) $[8s + 4t] - [4p + q + 5r]$ (2) $[4p + 2q + 5r] - [8s + 4t]$
(3) $[4p + 2q + 5r + 8s + 4t]$ (4) $[2p + q + 5r] - [8s + 4t]$

Ans. (2)

8. Using bond energy data, calculate heat of formation of isoprene



Given C-H, H-H, C-C, C=C and C(s) → C(g) respectively as 98.8 kcal, 104 kcal, 83 kcal, 147 kcal, 171 kcal

- (1) -21 kcal (2) 21 kcal (3) 40 kcal (4) 50 kcal

Ans. (2)

9. Entropy of vaporisation of water at 100°C, if molar heat of vaporisation is 9710 cal mol⁻¹ will be

- (1) 20 cal mol⁻¹ K⁻¹ (2) 26.0 cal mol⁻¹ K⁻¹ (3) 24 cal mol⁻¹ K⁻¹ (4) 28.0 cal mol⁻¹ K⁻¹

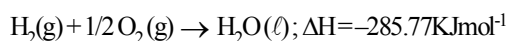
Ans. (2)

10. If ΔH_f^o of ICl_(g), Cl_(g), and I_(g) is 17.57, 121.34 and 106.96 J mol⁻¹ respectively. Then bond dissociation energy of ICl bond is -

- (1) 35.15 J mol⁻¹ (2) 106.69 J mol⁻¹ (3) 210.73 J mol⁻¹ (4) 420.9 J mol⁻¹

Ans. (3)

11. The enthalpy of vapourisation of liquid water using the data:

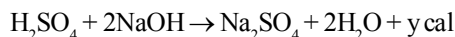
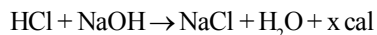


- (1) + 43.93 KJ mol⁻¹ (2) - 43.93 KJ mol⁻¹ (3) + 527.61 KJ mol⁻¹ (4) - 527.61 KJ mol⁻¹

Ans. (1)

DPP - 3

1. In the reactions



(1) $x = y$

(2) $x = 2y$

(3) $x = \frac{y}{2}$

(4) $x = \sqrt{y}$

Ans. (3)

2. The difference between ΔH and ΔE for the reaction $2\text{C}_6\text{H}_6(l) + 15\text{O}_2(g) \rightarrow 12\text{CO}_2(g) + 6\text{H}_2\text{O}(l)$ at 25°C in kJ is

(1) -7.43 kJ

(2) $+3.72 \text{ kJ}$

(3) -3.72 kJ

(4) $+7.43 \text{ kJ}$

Ans. (1)

3. The heat of neutralization of LiOH and HCl at 25°C is $34.868 \text{ kJ mol}^{-1}$. The heat of ionisation of LiOH will be

(1) 44.674 kJ

(2) 22.232 kJ

(3) 32.684 kJ

(4) 96.464 kJ

Ans. (2)

4. Which compound will absorb the maximum amount of heat when dissolved in the same amount of water ? (Integral heats of solution at 25°C in kcal/mol of each solute are given in brackets)

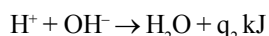
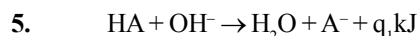
(1) $\text{HCl} (\Delta H = -17.74)$

(2) $\text{HNO}_3 (\Delta H = -7.85)$

(3) $\text{NH}_4\text{NO}_3 (\Delta H = +16.08)$

(4) $\text{NaCl} (\Delta H = +1.02)$

Ans. (3)



The enthalpy of ionisation of HA is

(1) $(q_1 + q_2)$

(2) $(q_1 - q_2)$

(3) $(q_2 - q_1)$

(4) $-(q_1 + q_2)$

Ans. (3)

6. For strong acid strong base neutralisation energy for 1 mole H_2O formation is -57.1 kJ . If 0.25 mole of strong monoprotic acid is reacted with 0.5 mole of strong base then enthalpy of neutralisation of

(1) $-(0.25 \times 57.1)$

(2) 0.5×57.1

(3) 57.1

(4) $-(0.5 \times 57.1)$

Ans. (1)

7. The heat of combustion of solid benzoic acid at constant volume is -321.3 kJ at 27°C . The heat of combustion at constant pressure is

(1) $-321.3 - 300R$

(2) $-321.30 + 300R$

(3) $-321.3 - 150R$

(4) $-321.3 + 900R$

Ans. (3)

8. The standard entropies of $\text{N}_2(g)$, $\text{H}_2(g)$ and $\text{NH}_3(g)$ are 191.5 , 130.5 , $192.6 \text{ JK}^{-1} \text{ mol}^{-1}$. The value of ΔS° of formation of ammonia is

(1) $-98.9 \text{ JK}^{-1} \text{ mol}^{-1}$

(2) Zero

(3) $+129.4 \text{ JK}^{-1} \text{ mol}^{-1}$

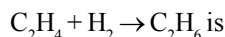
(4) $-29.4 \text{ JK}^{-1} \text{ mol}^{-1}$

Ans. (1)

9. Given $S^\circ_{\text{C}_2\text{H}_6} = 225 \text{ J mol}^{-1} \text{ K}^{-1}$

$S^\circ_{\text{C}_2\text{H}_4} = 220 \text{ J mol}^{-1} \text{ K}^{-1}$, $S^\circ_{\text{H}_2} = 130 \text{ J mol}^{-1} \text{ K}^{-1}$

Then ΔS° for the process



(1) $+25 \text{ J}$

(2) -125 J

(3) 135 J

(4) 315 J

Ans. (2)

10. For the melting of NaCl heat required is $7.26 \text{ kcal mol}^{-1}$ and ΔS increases by $6.73 \text{ cal mol}^{-1} \text{ K}^{-1}$. The melting point of the salt is
 (1) 805.75°C (2) 500 K (3) 1.77 K (4) 1.77°C
Ans. (1)
11. The ΔS for the reaction
 $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{l})$ at 300 K when
 $S^\circ_{\text{H}_2}(\text{g}) = 126.6$, $S^\circ_{\text{O}_2}(\text{g}) = 201.20$, $S^\circ_{\text{H}_2\text{O}}(\text{l}) = 68.0 \text{ JK}^{-1}\text{mol}^{-1}$ respectively is
 (1) $-318.4 \text{ JK}^{-1}\text{mol}^{-1}$ (2) $318.4 \text{ JK}^{-1}\text{mol}^{-1}$ (3) $31.84 \text{ JK}^{-1}\text{mol}^{-1}$ (4) $3.184 \text{ JK}^{-1}\text{mol}^{-1}$
Ans. (1)
12. Which of the following is correct ?
- | | ΔH | ΔS | Nature of reaction |
|-----|------------|------------|--|
| (1) | (-) | (+) | Spontaneous only at high temperature |
| (2) | (+) | (-) | Nonspontaneous regardless of temperature |
| (3) | (+) | (+) | Spontaneous only at low temperature |
| (4) | (-) | (-) | Spontaneous at all temperatures |
- Ans. (2)**
13. A particular reaction at 27°C for which $\Delta H > 0$ and $\Delta S > 0$ is found to be non-spontaneous. The reaction may proceed spontaneously if
 (1) The temperature is decreased (2) The temperature is increased
 (3) The temperature is kept constant (4) It is carried in open vessel at 27°C
Ans. (2)
14. It is impossible for a reaction to take place if
 (1) ΔH is +ve and ΔS is +ve (2) ΔH is -ve and ΔS is +ve
 (3) ΔH is +ve and ΔS is -ve (4) ΔH is -ve and ΔS is -ve
Ans. (3)
15. The sole criterion for the spontaneity of a process is
 (1) Tendency to acquire minimum energy
 (2) Tendency to acquire maximum randomness
 (3) Tendency to acquire minimum energy and maximum randomness
 (4) Tendency to acquire maximum stability
Ans. (4)
16. If water is formed from H^+ ions and OH^- the heat of formation of water is :
 (1) -13.7 Kcal (2) 13.7 Kcal (3) -63.4 Kcal (4) More data required
Ans. (1)
17. The heat of solution of anhydrous CuSO_4 and $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ are -15.89 and $2.80 \text{ Kcal mol}^{-1}$ respectively. What will be the heat of hydration of anhydrous CuSO_4 ?
 (1) -18.69 Kcal (2) 18.69 Kcal (3) -28.96 Kcal (4) 28.96 Kcal
Ans. (1)