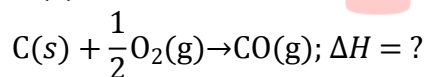


Topic :- THERMODYNAMICS

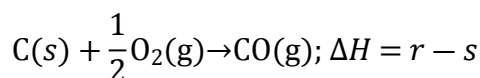
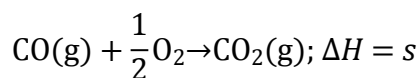
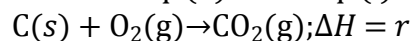
1. **(a)**
Ice takes up heat to melt and thus, enthalpy change is +ve.
3. **(a)**
When $\Delta H = -ve$, $\Delta S = +ve$ and $\Delta G = -ve$ than reaction is spontaneous

4. **(d)**
 $KE = (3/2)RT$

5. **(b)**
 $C(s) + O_2(g) \rightarrow CO_2(g); \Delta H = r$
 ... (i)
 $CO(g) + \frac{1}{2}O_2(g) \rightarrow CO_2(g); \Delta H = s$
 ... (ii)



Subtract Eq. (ii) from Eq. (i)



6. **(d)**
 $Cu(g) \rightarrow Cu^+(g) + e, \quad \Delta H = 745 \text{ kJ mol}^{-1}$
 $I(g) + e \rightarrow I^-(g); \quad \Delta H = -295 \text{ kJ mol}^{-1}$
Adding $Cu^+(g) + I^-(g) \rightarrow CuI(g); \Delta H^\circ = -446 \text{ kJ mo}$
 $Cu(g) + I(g) \rightarrow CuI(g); \quad \Delta H^\circ = 4 \text{ kJ mol}^{-1}$

7. **(a)**

Entropy of universe is tending towards maximum.

9 (a)

$$\Delta H_{(\text{reaction})} = \Delta H_{f(\text{diamond})} - \Delta H_{f(\text{graphite})} \\ = 1.896 -$$

$$0.23 = 1.666 \text{ kJ/mol}$$

10 (b)

$$p = 1 \text{ atm}$$

$$\Delta V = (50 - 15) = 35 \text{ L}$$

$$\therefore W = -p \cdot \Delta V = -1 \times 35 \\ = -35 \text{ Latm}$$

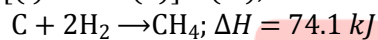
Hence, work done by the system on the surroundings is equal to 35 L-atm.

11 (d)

The product possesses maximum energy and thus, least stable.

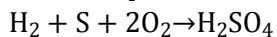
12 (d)

By eq. [(i) + 2 × (ii)] - (iii),



13 (a)

For the equation,



Eqs. (i) + (ii) + (iii) + (iv)

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

14 (d)

(a) For isochoric process, $\Delta V = 0$

$$W = p\Delta V = 0$$

$$\therefore \Delta E = Q$$

(b) For adiabatic process, $Q = 0$

$$\Delta E = W$$

(c) For isothermal process, $\Delta T = 0$

$$\text{and} \quad \Delta E = 0$$

$$Q = -W$$

(d) For cyclic process, state functions like

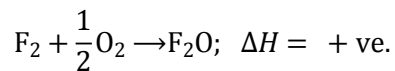
$$\Delta E = 0$$

$$Q = -W$$

16 (a)

$$\Delta G = \Delta H - T\Delta S = -ve - ve = -ve$$

17 (a)



18 (c)

Two equivalent of each are used.

19 (a)

Isothermally (at constant temperature) and reversible work.

$$\begin{aligned} W &= 2.303 nRT \log \frac{p_2}{p_1} \\ &= 2.303 \times 1 \times 2 \times 300 \log \frac{10}{2} \\ &= 2.303 \times 600 \times \log 5 = 965.84 \end{aligned}$$

At constant temperature, $\Delta E = 0$

$$\Delta E = q + W, q = -W = -965.84 \text{ cal}$$

20 (d)

The gaseous phase have more entropy and thus, ΔS is +ve in (a) and (b). Also decrease in pressure increases disorder and thus, ΔS is +ve in (c). In (d) the disorder decreases in liquid state due to decrease in temperature. Thus, $\Delta S = -ve$.

ANSWER-KEY										
Q.	1	2	3	4	5	6	7	8	9	10
A.	A	D	A	D	B	D	A	A	A	B
Q.	11	12	13	14	15	16	17	18	19	20
A.	D	D	A	D	B	A	A	C	A	D

PE