

$$\Delta_r S = +198.0 \text{ JK}^{-1} \text{ mol}^{-1}$$

$$\Delta G = 0 \text{ at equilibrium}$$

$$T = \frac{\Delta H}{\Delta S} = \frac{491.1 \times 10^3}{198.0} = 2480.3 \text{ K}$$

22.(A) For spontaneous process

$$\Delta G = (\Delta H - T\Delta S) \text{ should be negative}$$

$$\therefore \Delta G < 0$$

23.(C) q & w are path functions.

Option (C) is correct

24.(D) Maltose is a disaccharide made up two D-glucose units. On treatment with dil. HCl it undergoes hydrolysis to give two D-glucose units. (Monosaccharide)

$$\begin{aligned} \Delta H &= \int nC_p dT = 3 \int_{300}^{1000} (23 + 0.01T) dT = 3 \left[23T + \frac{0.01T^2}{2} \right]_{300}^{1000} \\ &= 3 \left[23000 + \frac{0.01}{2}(1000)^2 - 23(300) - \frac{0.01(300)^2}{2} \right] \\ &= 3[23000 + 5000 - 6900 - 450] = 61950 \text{ J} \approx 62 \text{ kJ} \end{aligned}$$

26.(B) According to first law of thermodynamics : $\Delta U = q + w$

For adiabatic process, $q = 0$

$$\text{Hence, } \Delta U = w$$

27.(A) $\Delta U = q + W$

$$\Delta U = (-2) + 10 = 8 \text{ kJ}$$

28.(A) $\Delta U = nC_v \Delta T = \frac{5 \times 28 \times 100}{1000} = 14 \text{ kJ}$

$$\Delta(pV) = nR\Delta T = \frac{5 \times 8 \times 100}{1000} = 4 \text{ kJ}$$

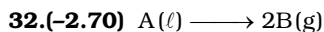
29.(6.25) $\Delta U = nC_v \Delta T$

$$500 = 4 \times C_v \times (500 - 300)$$

$$C_v = \frac{5000}{4 \times 200} = 6.25 \text{ JK}^{-1} \text{ mol}^{-1}$$

30.(D) $\Delta S = \int \frac{dq}{T}$; $S = \int_0^T \frac{nCdT}{T}$

31.(48.00) Work done = Area under the curve $= \frac{1}{2}(6 + 10) \times 6 = 48 \text{ J}$



$$\Delta U = 2.1 \text{ kcal}, \Delta S = 20 \text{ cal/k}, T = 300 \text{ K}$$

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

$$\Delta H = \Delta U + \Delta n_g RT \quad \Delta n_g = 2$$

$$\Delta G = 3300 - (300)(20) = 3300 - 6000 = -2700 \text{ cal} = -2.7 \text{ kcal}$$