**ENERGETICS (Answer Key)**

1. **(D)**

**Sol.** $\Delta S = \frac{\Delta H}{T} + R \ln \frac{P_i}{P_f} = \frac{40668}{373} + 8.314 \ln 10 = 128.17$

2. **(B)** $Na^+(g) + Cl^-(g) \longrightarrow NaCl(s)$ ; $\Delta H = -180$ kcal

$NaCl(s) + aq \longrightarrow Na^+(aq) + Cl^-(aq)$ ; $\Delta H = 1$ kcal

$Na^+(g) + Cl^-(g) + aq \longrightarrow Na^+(aq) + Cl^-(aq)$ ; $\Delta H = A$ kcal $= H_{hydration}$

$\therefore \quad 1 = 180 + \Delta H_{hydration}$

$\therefore \quad \Delta H_{hydration} = -179$ kcal $= A$

$\Delta H_{Na^+}$ (hydration) + $\Delta H_{Cl^-}$ (hydration) = A

$\Delta H_{Na^+}$ (hydration) = $\frac{6A}{11} = \frac{6 \times (-179)}{11}$ = **– 97.6 kcal**.

3. **(C)** $\frac{d}{dT}\left(\frac{\Delta G^o}{T}\right) = -\frac{\Delta H^o}{T^2}$

$= \frac{d}{dT}\left(\frac{10}{T} - 5 + 6 \ln T\right) = -\frac{\Delta H^o}{T^2}$

$\Rightarrow -\frac{10}{T^2} + \frac{6}{T} = -\frac{\Delta H^o}{T^2} \quad \Delta H^o = 10 - 6T$

4. c 5. d 6. c 7. b 8.c 9. c 10. c

11. **(ABD)** 12. **(C)** 13. a, c, d 14. ABC 15. AB 16. ABD 17. A,b,c

18. **(A)** Since entropy and internal energy are state functions so for the entire process $\Delta U = 0$, $\Delta S = 0$

**19. (C)**

20. 2

21. **(2)** $\Delta S = -n_{tot} R \sum x_i \ln x_i$

$= -0.1 \times R \times \left(\frac{1}{10} \ln \frac{1}{10}\right) \times 10$

$= 2$