Daily Tutorial Sheet-2	Level-1

16.(A) For cyclic process, change in state function is zero. Since ΔU and ΔH are state variables, $\Delta U = 0$ and $\Delta H = 0$.

17.(B) $W = -nRT\ell n\frac{V_2}{V_1} = -1\times 8.314\times 298\times 2.303\log\frac{20}{10} = -298\times 8.314\times 10^7\times 2.303\log 2$

18.(C) $(\Delta C_P)_{rxn} = 0, \quad \therefore \quad \Delta H_{300} = \Delta H_{310}$

19.(D) From given reaction $\Delta n_g = 12 - 15 = -3$

so $\Delta E^o = \Delta H^o - \Delta n_g\, RT = -6542 + 3RT$

for 1.5 mole, $\Delta E^o = \frac{1.5}{2}\{-6542+3RT\} = -4900.9$ kJ

20.(C) $\Delta n_g = 1 - 2 = -1$

$\Delta E = \Delta H - \Delta n_g RT = \Delta H - RT = -72.3 + 8.314\times 300\times 10^{-3} = -69.806$ kJ/mol

So for 3 mole we will get $\Delta E = -69.806\times 3$ kJ/mole $= -209.42$ kJ/mole

21.(B) $W = -P_{ext}(\Delta V) = -(1\text{ atm})\times 500\times 50\times 10^{-3}\text{L} = -25\text{L atm} = -25\times 101.3\times 10^{-3}$ kJ $= -2.53$ kJ

22.(A)

C_2H_4	+	H_2	$\longrightarrow$	C_2H_6
50ml		50ml		0
X		X		50ml

$\Delta H = \Delta U + P(\Delta V)$

$-0.31 = \Delta U + 1.5\times 1.01\times 10^5(-50\times 10^{-6})\times 10^{-3}$

$\Delta U = -0.3024$ kJ

23.(B) $H_2O(s)\longrightarrow H_2O(l), \quad \Delta H = 1440$ cal

$\Delta H \cong \Delta U$ for solids and liquids

24.(A) Beaker is open and in open beaker external pressure remains constant.

$Zn + H_2SO_4 \longrightarrow ZnSO_4 + H_2(g)$

$\frac{130}{65} = 2$ mole

$PV = nRT$

$P\Delta V = \Delta n_g RT$

$W = -\Delta n_g RT = -2\times 2\times 300 = -1200$ cal

25.(C) $q = \Delta H = 60\,\text{cal} = nC_{P,m}\Delta T$

$\Delta U = nC_{V_m}\Delta T$

$\Rightarrow \quad \frac{60}{\Delta U} = \gamma \quad \Rightarrow \quad \Delta U = \frac{60}{1.4} = 42.8\,\text{cal}$

26.(B) $(C_{V_m})_{mix} = \frac{n_1C_{V_m} + n_2C_{V_m}}{n_1 + n_2} = \frac{2\times\frac{3R}{2} + 2\times\frac{5R}{2}}{4} = 2R$

27.(B) $W = -nRT\,\ell n\dfrac{V_2}{V_1} = -52\times10^{-3}\times8.314\times260\times2.303\log\dfrac{1}{3} = 123\,J$

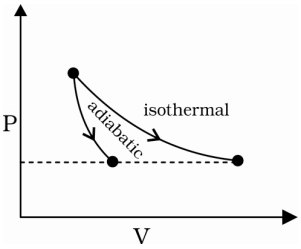
28.(C) $W = -P_{ext}\left(V_2 - V_1\right) = -3\times2 = -6\,lt\text{-}atm = -6\times101.3 = -607.8\,J$

$\therefore \quad 607.8 = ms\Delta T$

$\Rightarrow \quad 607.8 = 10\times18\times4.18\times\Delta T$

$\Delta T = 0.8 \quad \Rightarrow \quad T_2 = 290.8\,K$

29.(B)



For adiabatic process, final volume and final temperature will be lower as compared to isothermal process

30.(D) $\Delta H° = -3\Delta H_1^\circ + \Delta H_2^\circ + 2\Delta H_3^\circ + 3\Delta H_4^\circ = -747.4$ kJ

$\Delta H° = \Delta U° + \Delta n_g$ RT, where $\Delta n_g = -8$

$-747.4 = \Delta U^o - \dfrac{8\times8.314\times300}{1000}$

$\Delta U° = -727.44$ kJ