Daily Tutorial Sheet-1	Level-1

1.(B) Work done $(W) = -p_{ext}(V_2 - V_1)$

$$= -3 \times (6 - 4) = -6\,L\,atm$$

$$= -6 \times 101.32\,J \qquad (\therefore 1L\ atm\ = 101.32\ J)$$

$$= -607.92 \approx -608\,J$$

2.(D) In the adiabatic process no heat enters or leaves the system i.e., q = 0.

3.(B) For an isothermal process $\Delta T = 0$ and $\Delta E = 0$ and $q \neq 0$.

4.(A) V_1 = 100 mL ; V_2 = 250 mL

Pressure $p = 2\,atm$ or $2 \times 1.01 \times 10^5\,Nm^{-2}$

Work done by the gas $W = p\Delta V$ or $p(V_2 - V_1)$

Put the value in given formula

$$W = 2 \times 1.01 \times 10^5 (0.250 \times 10^{-3} - 0.100 \times 10^{-3}) = 2 \times 1.01 \times 10^5 \times 0.15 \times 10^{-3} = 30.30\,J$$

5.(A) From first law of thermodynamic.

$\Delta E = q + W$ Given, q = + 300 cal $\qquad$ ($\therefore$ Heat is absorbed)

$\qquad\qquad$ W = − 500 cal $\qquad\qquad$ ($\therefore$ Work done on surroundings)

$\therefore \qquad\qquad \Delta E = q + W = 300 + (-500) = -200\,cal$

6.(B) $A \rightarrow B, \Delta H = +24\ kJ/mol$

$\Rightarrow \qquad H_B - H_A = +24 \qquad$ **........ (i)**

$B \rightarrow C, \Delta H = -18\ kJ/mol$

$\Rightarrow \qquad H_C - H_B = -18 \qquad$ **........ (ii)**

$\Rightarrow \qquad H_B - H_C = +18$

From Equations (i) and (ii), we have

$$H_C - H_A = 6$$

$$H_B > H_C > H_A$$

7.(C) This is based on Joule-Thomson effect.

8.(B) Molar heat capacity Heat required to raise the temperature of 1 mole of a substance by 1°C is called molar heat capacity.

9.(A) Work done

$$(W) = -P_{ext}(V_2 - V_1) = -1 \times 10^5\,Nm^{-2} \times (1 \times 10^{-2} - 1 \times 10^{-3})m^3 = -10^5 \times 9 \times 10^{-3}J = -900\,J$$

10.(B) **(A)** Temperature constant $\qquad$ **(B)** Pressure constant

$\qquad\qquad$ **(C)** Heat exchange is zero $\qquad$ **(D)** Volume constant

11.(C) Heat exchange is zero

12.(B) $\Delta H = \Delta U + \Delta n_g RT$

$$\Delta U = -3271 + \frac{3}{2} \times 8.314 \times 10^{-3} \times 300$$

$\Delta U = -3267.25$

Now for 1.5 mole

$\Delta U = -3267.25 \times 1.5 = -4900.88\,J$

13.(B) $W = -P_{ext}(V_2 - V_1) = -2 \times 20 = -40\, lt - atm$

$\qquad = -40 \times 101.3\, J = -4052\, J$

$\qquad \Delta U = q + W = 10000 - 4052 = 5948\, J$

14.(A) $V = \dfrac{nR}{P} \cdot T$

$\qquad \Rightarrow \qquad \log V = \log T + \log \dfrac{nR}{p}$

$\qquad \Rightarrow \qquad y = mx + C$

$\qquad$ Where $m = 1 \quad \Rightarrow \quad \theta = 45°$

$\qquad C = \log \dfrac{nR}{p} = \log \dfrac{100 \times 0.0821}{8.21} = 0$

15.(B) $W = -nRT\, \ell n \dfrac{P_1}{P_2} = -10 \times 300 \times 8.314\, \ell n \dfrac{10}{1} = -57441\, J$

$\qquad W = mgh$

$\qquad \Rightarrow \qquad m = \dfrac{57441}{9.8 \times 100} = 58.6\, kg$