76.(BCD) **(A)** Expansion of an ideal gas against vaccum is an irreversible process.

(B) Spontaneous process is always irreversible.

(C) As per definition of reversible process.

(D) If expansion is carried out reversibly, system will do work and hence, it will absorb more heat from the surroundings.

77. **[A : 1, 2] ; [B : 3] ; [C : 1, 2, 3] ; [D : 4]**

(A) For isothermal process : $\Delta U = \Delta H = 0$

(B) For reversible adiabatic process : $\Delta S = 0$

(C) For cyclic process : $\Delta U = \Delta H = \Delta S = 0$

(D) For isochoric process : $w = 0$

78.(C) $W_{irr} = -P_{ext}(V_2 - V_1)$

$$W = -1(20-10) = -10\,dm^3\,atm = -10\,dm^3 \times \frac{8.314\ JK^{-1}mol^{-1}}{0.0821\ dm^3\,K^{-1}\ mol^{-1}} = -1013\,J$$

From, 1st w of thermodynamics $\Delta U = q + W = 800\,J + (-1013\,J) = -213\,J$

79.(D) In neutralization reaction, when acid and base both are weak, a large amount of heat is utilized to ionise them. Thus, for such reactions, enthalpy of the reaction is least.

Hence, enthalpy is least for $HCN + NH_4OH \longrightarrow NH_4CN + H_2O$

80.(B) $\Delta S = 16\,J\,mol^{-1}\,K^{-1}$, $\Delta H_v = 6\,kJ\ mol^{-1}$

$$T_{bp} = \frac{\Delta H_{vapour}}{\Delta S_{vapour}} = \frac{6\times1000}{16} = 375\,K$$

81.(A) In bomb calorimeter, volume is constant, so, $w = 0$ and $\Delta U = q$.
Since q is calculated by the change in temperature of calorimeter, we have to notice the sign of ΔU. For exothermic ΔU is negative and for endothermic ΔU is $+$ve.

82.(D) $q = \Delta H_{vap} \longrightarrow \boxed{\ \ } \longrightarrow W = -P_{ext.}\,\Delta V$

$$\Delta U = q + W = 41000 - 1\times10^5 \times \left(\frac{1\times8.314\times373}{1\times10^5} - 0\right) = (41000 - 3101.122)J = 37.9\ kJ$$

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

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

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

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

84.(BCD) $\frac{P}{Q}$, PQ, $\frac{dP}{dQ}$ are intensive properties

85.(AB) For isothermal and cyclic process, $\Delta E = 0$