96.(B) $\Delta_{vap}H^{o} = 29.4\,kJ\ mol^{-1}$ and $T_{boiling} = 334.7\,K$

$\Delta_{vap}H^{\circ} = 29.4\,kJ\ mol^{-1}$ and $T_{boiling} = 334.7\,K$

$\Rightarrow \quad \Delta_{vap}S^{\circ} = \dfrac{\Delta_{vap}H^{\circ}}{T_{boiling}} = 87.84\,J\ mol^{-1}K^{-1} = 10.6\,R$

97.(D) Sucrose (molecular weight) = 342

From $\Delta G = \Delta H - T\Delta S = -6000\times10^{3} - 300\times180 = -6054\times10^{3}\,kJ/mol$

For 34.2 gm energy available $= \dfrac{6054}{342}\,kJ\times34.2 = 605.4\,kJ$

98.(D) $H_2O(\ell) \rightleftharpoons H_2O(s)$; $\quad \Delta_rH < 0$ and $\Delta_rS < 0$

99.(C) $-\Delta_rG^{\circ} = RT\ell n\,K_{eq} < 0 \qquad [\because K_{eq} < 1]$

$\Rightarrow \quad \Delta_rG^{\circ} > 0$ and $\Delta_rG^{\circ} = \Delta_rH^{\circ} - T\Delta_rS^{\circ}$

Clearly, $\Delta_rS^{\circ} > 0 \quad \Rightarrow \quad \Delta_rG^{\circ} < \Delta_rH^{\circ}$

100.(CD) $\Delta S \propto \dfrac{1}{T}$ and $\Delta_rG = \Delta_rH - T\Delta_rS$

101.(A) $\Delta_rH^{\circ} = \Delta_fH^{\circ}_{CH_4} = -74.9\,kJ/mol$

and $\Delta_rS^{\circ} = S^{\circ}_{CH_4} - 2S^{\circ}_{H_2} - S^{\circ}_{C} = 186.3 - 2\times130.7 - 5.6 = -80.7\,J/mol$

$\Delta_rG^{\circ} = \Delta_rH^{\circ} - T\Delta_rS^{\circ} = -74.9 - 298\times(-80.7)\times10^{-3} = -50.85\,kJ/mol$

$\Rightarrow$ Reaction is spontaneous due to highly negative enthalpy change.

102.(B) $CCl_4(\ell) \rightleftharpoons CCl_4(g)$

Δ_fH°	−135.4	−103.0	$\Delta_rH^{\circ} = -103 - (-135.4) = 32.4\,kJ/mol$
S°_m	215.4	308.7	$\Delta_rS^{\circ} = 308.7 - 215.4 = 93.3\,J/K/mol$

$T_{boiling} = \dfrac{\Delta_rH^{\circ}}{\Delta_rS^{\circ}} = \dfrac{32.4\times10^{3}}{93.3} = 347.3\,K = 74.3^{\circ}C$

103.(C) For an isothermal process : $dG = VdP \quad \Rightarrow \quad \Delta G = \int VdP = \int \dfrac{nRT}{P}\cdot dP$

$\Rightarrow \quad \Delta G = nRT\,\ell n\dfrac{P_2}{P_1} = 1\times8.314\times293\,\ell n\dfrac{2}{1} = +1.7\,kJ/mol$

104.(A) $\Delta_rS^{\circ}_{Total} = 56 = \Delta_rS^{\circ}_{system} + \Delta_rS^{\circ}_{surrounding}$

$\Delta S_{surr} = \dfrac{-\Delta_rH^{\circ}_{system}}{373} = \dfrac{4.1\times10^{4}}{373} = 109.9\,J/K$

$\Delta S_{sys} = 56 - 110 = -54\,J/K$

105.(D) $\Delta S_{surrounding} = \dfrac{q_{surrounding}}{T_{surrounding}} = \dfrac{64\times10^{3}}{300} = 213.3\,J/K$