Q.2 Consider the following cell reaction :

$Cd_{(s)} + Hg_2SO_{4(s)} + \frac{9}{5}H_2O_{(l)} \rightleftharpoons CdSO_4.\frac{9}{5}H_2O_{(s)} + 2Hg_{(l)}$

The value of E^0_{cell} is 4.315 V at 25^{0}C. If ΔH^0 = −−825.2 kJ mol^{-1}, the standard entropy change ΔS^0 in J K^{-1} is ________. (Nearest integer) [Given : Faraday constant = 96487 C mol^{-1}]

31st Aug Morning Shift 2021

Ans 2.

$$\Delta G^\circ = -nFE^\circ = \Delta H^\circ - T\Delta S^\circ$$

$$\therefore \Delta S^\circ = \frac{\Delta H^\circ + nFE^\circ}{T}$$

$$= \frac{(-825.2\times10^3)+(2\times96487\times4.315)}{298}$$

$$= \frac{-825.2\times10^3+832.682\times10^3}{298}$$

$$= \frac{7.483\times10^3}{298} = 25.11\ \text{JK}^{-1}\ \text{mol}^{-1}$$

∴ Nearest integer answer is 25.