Q1: 24 Feb (Shift 2) - Numerical

Assuming ideal behaviour, the magnitude of log K for the following reaction at $25^{\circ} \mathrm{C}$ is $\mathrm{x} \times 10^{-1}$. The value of x is ____.(Integer answer)

$3 \mathrm{HC} \equiv \mathrm{CH}_{(\mathrm{g})} \rightleftharpoons \mathrm{C}_6 \mathrm{H}_{6(\ell)}$

$\left[\text{Given } : \Delta_f \mathrm{G}^{\circ}(\mathrm{HC} \equiv \mathrm{CH})=-2.04 \times 10^5\right] \mathrm{mol}^{-1} ; \Delta_{\mathrm{f}} \mathrm{G}^{\circ}\left(\mathrm{C}_6 \mathrm{H}_6\right)=-1.24 \times 10^5 \mathrm{~J} \mathrm{~mol}^{-1}$

$\left.\mathrm{R}=8.314 \mathrm{~J} \mathrm{~K}^{-1} \mathrm{~mol}^{-1}\right]$

Q2: 25 Feb (Shift 1) - Numerical

The reaction of cyanamide, $\mathrm{NH}_2 \mathrm{CN}_{(\mathrm{s})}$ with oxygen was run in a bomb calorimeter and $\Delta \mathrm{U}$ was found to be $-742.24 \mathrm{~kJ} \mathrm{~mol}^{-1}$. The magnitude of $\Delta \mathrm{H}_{298}$ for the reaction

$\mathrm{NH}_2 \mathrm{CN}_{(\mathrm{s})}+\frac{3}{2} \mathrm{O}_2(\mathrm{~g}) \rightarrow \mathrm{N}_{2(\mathrm{~g})}+\mathrm{O}_{2(\mathrm{~g})}+\mathrm{H}_2 \mathrm{O}_{(1)}$ is ____ kJ. (Rounded off to the nearest integer)

[Assume ideal gases and $\mathrm{R}=8.314 \mathrm{~J} \mathrm{~mol}^{-1} \mathrm{~K}^{-1}$]

Q3: 25 Feb (Shift 2) - Numerical

Five moles of an ideal gas at 293 K is expanded isothermally from an initial pressure of 2.1MPa to 1.3 MPa against at constant external 4.3 MPa. The heat transferred in this process is ____ $\mathrm{kJ} \mathrm{~mol}^{-1}$. (Rounded-off of the nearest integer) [Use $\mathrm{R}=8.314 \mathrm{~J} \mathrm{~mol}^{-1} \mathrm{~K}^{-1}$]

Q4: 26 Feb (Shift 1) - Numerical

For a chemical reaction $A+B \rightleftharpoons C+D\left(\Delta_r \mathrm{H}^{\ominus}=80 \mathrm{~kJ} \mathrm{~mol}^{-1}\right)$ the entropy change $\Delta_r \mathrm{S}^{\ominus}$ depends on the temperature T (in K) as $\Delta_r S^{\ominus}=2 T\left(J \mathrm{~K}^{-1} \mathrm{~mol}^{-1}\right)$

Minimum temperature at which it will become spontaneous is ____ K.

Answer Key

Q1 (855) **Q2** (741) **Q3** (15) **Q4** (200)