Q1 JEE Main 2020 - 4 September (Morning)

For one mole of an ideal gas, which of these statements must be true?
(a) U and H each depends only on temperature
(b) Compressibility factor z is not equal to 1
(c) $C_{P,m} - C_{v,m} = R$
(d) $\mathrm{dU} = \mathrm{C_v dT}$ for any process

(A) (a) and (c)
(B) (a), (c) and (d)
(C) (b), (c) and (d)
(D) (c) and (d)

Q2 JEE Main 2020 - 4 September (Evening)

Five moles of an ideal gas at 1 bar and $298\mathrm{K}$ is expanded into vacuum to double the volume. The work done is

(A) Zero
(B) $-\mathrm{RT}\ln \mathrm{V_2/V_1}$
(C) $\mathrm{C_v}\left(\mathrm{T_2} - \mathrm{T_1}\right)$
(D) $-\mathrm{RT}(\mathrm{V_2} - \mathrm{V_1})$

Q3 JEE Main 2020 - 5 September (Evening)

For a dimerization reaction,
$2\mathrm{A(g)} \rightarrow \mathrm{A_2(g)}$
at $298\mathrm{K}, \Delta\mathrm{U}^\circ = -20\mathrm{kJmol}^{-1}, \Delta\mathrm{S}^\circ = -30$
$\mathrm{JK}^{-1}\mathrm{mol}^{-1}$, then the $\Delta\mathrm{G}^\circ$ will be J.

Q4 JEE Main 2020 - 6 September (Morning)

The variation of equilibrium constant with temperature is given below:

Temperature	Equilibrium Constant
$\mathrm{T_1} = 25^\circ\mathrm{C}$	$\mathrm{K_1} = 10$
$\mathrm{T_2} = 100^\circ\mathrm{C}$	$\mathrm{K_2} = 100$

The values of $\Delta \mathrm{H}^{\circ}, \Delta \mathrm{G}^{\circ}$ at T_1 and $\Delta \mathrm{G}^{\circ}$ at T_2
(in kJ mol-1) respectively, are close to [Use $\mathrm{R}=8.314 \mathrm{JK}^{-1} \mathrm{mol}^{-1}$]

(A) 28.4,-5.71 and -14.29
(B) 0.64,-7.14 and -5.71
(C) 28.4,-7.14 and -5.71
(D) 0.64,-5.71 and -14.29

Q5 JEE Main 2020 - 6 September (Evening)

For a reaction,
$(4M(s) + nO_2(g) \rightarrow 2M_2O_n(s)$
the free energy change is plotted as a function of temperature. The temperature below which the oxide is stable could be inferred from the plot as the point at which

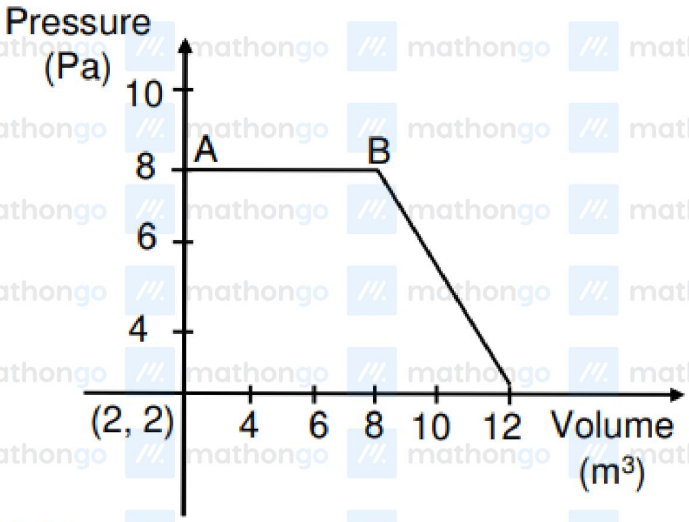
(A) the free energy change shows a change from negative to positive value
(B) the slope changes from positive to negative
(C) the slope changes from negative to positive
(D) the slope changes from positive to zero

Q6 JEE Main 2020 - 7 January (Morning)

$\text{For the reaction :}$
$A(\ell) \rightarrow 2B(g)$
$\Delta U = 2.1\ kcal,\ \Delta S = 20\ cal/K, \text{at}\ \ T = 300\ K.$
Hence $\Delta G\ (\text{in}\ kcal)$ is $-X$. Find the value of X

Q7 JEE Main 2020 - 8 January (Morning)

The magnitude of work done by a gas that undergoes a reversible expansion along the path ABC



shown in the figure is . . . .

Q8 JEE Main 2020 - 8 January (Evening)

At constant volume, 4 mol an ideal gas when heated from $300\ K$ to $500\ K$ changes its internal energy by $5000\ J$. The molar heat capacity at constant volume is. . . .

Multiply your answer with 100

Q9 JEE Main 2020 - 9 January (Evening)

The true statement amongst the following is:

(A) Both S and ΔS are not functions of temperature.

(B) S is not a function of temperature but ΔS is a function of temperature.

(C) Both ΔS and S are functions of temperature.

(D) S is a function of temperature but ΔS is not a function of temperature.

Answer Key

Q1 (B) **Q2** (A) **Q3** (-13537.57) **Q4** (A)

Q5 (A) **Q6** (-2.7) **Q7** (48) **Q8** (625)

Q9 (C)