States of Matter

Q.No.1: 0.5 moles of gas A and *x* moles of gas B exert a pressure of 200 Pa in a container of volume 10 m^3 at 1000 K. Given R is the gas constant in JK^{-1} mol^{-1}, *x* is: **JEE 2019**

A. $\frac{2R}{4+R}$

B. $\frac{2R}{4-R}$

C. $\frac{4+R}{2R}$

D. $\frac{4-R}{2R}$

Q.No.2: The volume occupied by 4.75 g of acetylene gas at 50°C and 740 mmHg pressure is _____ L.
(Rounded off to the nearest integer) [Given R = 0.0826 L atm K^{-1} mol^{-1}] **JEE 2021**

Q.No.3: A car tyre is filled with nitrogen gas at 35 psi at 27°C. It will burst if pressure exceeds 40 psi. The temperature in °C at which the car tyre will burst is _____. (Rounded-off to the nearest integer) **JEE 2021**

Q.No.4: 3.12 g of oxygen is adsorbed on 1.2 g of platinum metal. The volume of oxygen adsorbed per gram of the adsorbent at 1 atm and 300 K in L is _____.
[R = 0.0821 L atm K^{-1} mol^{-1}] **JEE 2021**

Q.No.5: A certain gas obeys $P(V_m - b) = RT$. The value of $\left(\frac{\partial Z}{\partial P}\right)_T$ is $\frac{xb}{RT}$. The value of x is _____. (Integer answer)
(Z : compressibility factor) **JEE 2021**

Q.No.6: The pressure exerted by a non-reactive gaseous mixture of 6.4 g of methane and 8.8 g of carbon dioxide in a 10 L vessel at 27°C is ..... kPa. (Round off to the Nearest Integer).
[Assume gases are ideal, R = 8.314 J mol^{-1} K^{-1} , Atomic masses : C : 12.0 u, H : 1.0 u, O : 16.0 u] **JEE 2021**

Q.No.7: At 1990 K and 1 atm pressure, there are equal number of Cl_2 molecules and Cl atoms in the reaction mixture. The value of K_p for the reaction $Cl_{2(g)} \rightleftharpoons 2Cl_{(g)}$ under the above conditions is $x \times 10^{-1}$. The value of x is _____.
(Rounded off to the nearest integer) **JEE 2021**

Q.No.8: The unit of the van der Waals gas equation parameter 'a' in $\left(P + \frac{an^2}{V^2}\right)(V - nb) = nRT$ is : **JEE 2021**

A. atm dm^6 mol^{-2}
B. kg m s^{-1}
C. kg m s^{-2}
D. dm^3 mol^{-1}

Q.No.9: An LPG cylinder contains gas at a pressure of 300 kPa at 27°C. The cylinder can withstand the pressure of 1.2×10^6 Pa. The room in which the cylinder is kept catches fire. The minimum temperature at which the bursting of cylinder will take place is _____ °C. (Nearest integer) **JEE 2021**

Q.No.10: 1 kg of 0.75 molal aqueous solution of sucrose can be cooled up to –4ºC before freezing. The amount of ice (in g) that will be separated out is _____. (Nearest integer)

[Given : K_f (H_2O) = 1.86 K kg mol^{-1}]

JEE 2021