Date Planned : __ / __ / __	Daily Tutorial Sheet-8	Expected Duration : 90 Min
Actual Date of Attempt : __ / __ / __	Level-2	Exact Duration :_________

96. A real gas most closely approaches the behaviour of an ideal gas at:

(A) 15 atm and 200 K **(B)** 1 atm and 273 K

(C) 0.5 atm and 500 K **(D)** 15 atm and 500 K

***97.** Which of the following statement is(are) correct?

(A) The slope of Z vs P at constant temperature for all real gases, is $\frac{b}{RT}$

(B) The slope of Z vs P at constant temperature for both He and H_2 is $\frac{b}{RT}$

(C) The slope of Z vs P at low pressure for all real gases, at constant temperature is $\frac{b}{RT}$

(D) The slope of Z vs P at high pressure and at constant temperature for real gas is $\frac{-b}{RT}$

98. Which of the following statements is(are) correct for a gas X having molar mass 5g and density 0.3g/litre at 0.5 atmospheric pressure at 300 K?

(A) The gas "X" will behave ideally

(B) The force of attraction will dominate over the force of repulsion among the gas molecules

(C) The force of repulsion will dominate over the force of attraction among the gas molecules

(D) None of these

99. At 47^oC and 16.0 atm, the molar volume of NH_3 gas is about 10% less than the molar volume of an ideal gas. This is due to :

(A) NH_3 decomposes to N_2 and H_2 at 47°C

(B) The force of attraction between NH_3 molecules is significant at this temperature and pressure

(C) The volume occupies by NH_3 molecules themselves is a significant fraction of the volume of the container at this temperature and pressure

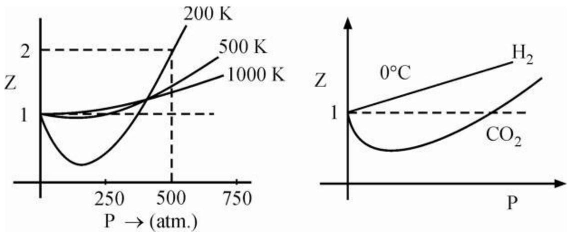
(D) at 16 atm, NH_3 molecules no longer move randomly

100. A gaseous mixture (He and CH_4) which has density $\frac{64}{246.3}$ gm/litre at 1 atm & 300 K is kept in a container. Now a pinhole is made on the wall of the container through which He(g) and CH_4(g) effuses. What will be the composition of the gas mixture $\left[n_{He} : n_{CH_4}\right]$ effusing out initially?

(A) 4 : 1 **(B)** 8 : 1 **(C)** 2 : 1 **(D)** 16 : 1

Paragraph for Question No. 101 - 104

Sketch shows the plot of Z vs P for 1 mol of a hypothetical gas at three distinct temperature.



Boyle's temperature is the temperature at which a gas shows ideal behaviour over a pressure range in the low pressure region. Boyle's temperature $(T_b) = \frac{a}{Rb}$. If a plot is obtained at temperatures well below Boyle's temperature then the curve will show negative deviation, in low pressure region and positive deviation in the high pressure region. Near critical temperature the curve is more like CO_2 and the temperature well above critical temperature curve is more like H_2 as shown above. At high pressure suppose all the constant temperature curve varies linearly with pressure according to the following equation: $Z = 1 + \frac{Pb}{RT}\left(R = 2\,\text{cal mol}^{-1}\text{K}^{-1}\right)$

101. Which of the following is correct:

(A) $\frac{a}{b} < 0.4\,\text{k cal mol}^{-1}$ **(B)** $0.4\,\text{k cal mol}^{-1} < \frac{a}{b} < 2\,\text{k cal mol}^{-1}$

(C) $\frac{a}{b} > 0.4\,\text{k cal mol}^{-1}$ **(D)** $\frac{a}{b} = 1\,\text{K cal mol}^{-1}$

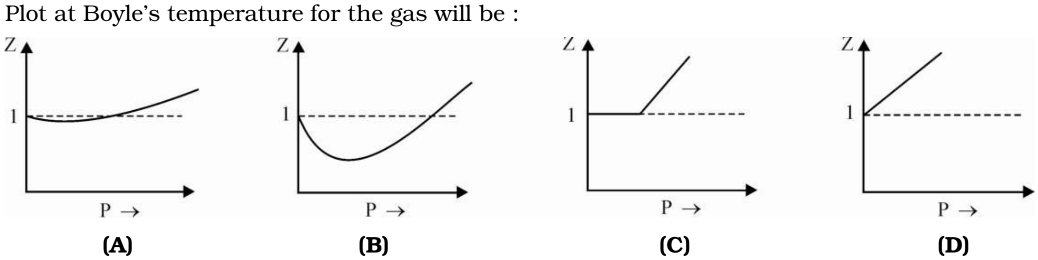
102. For 500 K plot the value of Z changes from 2 to 2.2 if pressure is varied from 1000 atm to 1200 atm (high pressure) then the value of $\frac{b}{RT}$ will be :

(A) $10^{-3}\,\text{atm}^{-1}$ **(B)** $2 \times 10^{-3}\,\text{atm}^{-1}$ **(C)** $5 \times 10^{-4}\,\text{atm}^{-1}$ **(D)** $10^{-4}\,\text{atm}^{-1}$

103. As shown in the figure at 200 K and 500 atm value of compressibility factor is 2 (approx). Then volume of the gas at this point will be :

(A) 0.01 L **(B)** 0.09 L **(C)** 0.065 L **(D)** 0.657 L

104. Plot at Boyle's temperature for the gas will be :



105. Compressibility factor for H_2 behaving as real gas is:

(A) 1 **(B)** $\left(1 - \frac{a}{RTV}\right)$ **(C)** $\left(1 + \frac{pb}{RT}\right)$ **(D)** $\frac{RTV}{(1-a)}$