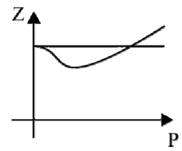
Daily Tutorial Sheet-8	Level - 2

96.(C) Look for low P and high T

97.(B) Slope $= \frac{b}{RT}$ only in the high pressure region.



For H_2 and He, $a \approx 0 \quad \Rightarrow \quad$ Slope $= \frac{b}{RT}$

98.(B) $Z = \frac{PV_m}{RT} = \frac{PV}{nRT} = \frac{PV \times M_0}{g \times RT} = \frac{PM_0}{\rho RT}$

$\Rightarrow \quad Z = \frac{0.5 \times 5}{0.3 \times 0.082 \times 300} = 0.34 < 1 \quad \Rightarrow$ Attractive forces dominate

99.(B) $Z = \frac{V_{m,\,real}}{V_{m,\,ideal}} = 0.9 \quad \Rightarrow$ Attractive molecular forces

100.(B) Let the mixture contain n_{He} moles of helium and n_{CH_4} moles of methane.

$$P = \frac{dRT}{M_o(mix)}$$

$$\Rightarrow M_o(mix) = \frac{dRT}{P} = \frac{64}{246.3} \times 0.0821 \times 300\,g = 6.4$$

$$M_o(mix) = \frac{(n_{He} \times M_o(He)) + (n_{CH_4} \times M_o(CH_4))}{n_{He} + n_{CH_4}}$$

$$6.4 = \frac{(n_{He} \times 4) + (n_{CH_4} \times 16)}{n_{He} + n_{CH_4}} \quad \Rightarrow \quad \frac{n_{He}}{n_{CH_4}} = \frac{4}{1}$$

$$\frac{r_{He}}{r_{CH_4}} = \frac{n_{He}}{n_{CH_4}}\sqrt{\frac{M_o(CH_4)}{M_o(He)}} = \frac{4}{1}\sqrt{\frac{16}{4}} = \frac{8}{1}$$

101.(D) Check that 500 K is Boyle's Temperature.

$\Rightarrow \quad 500 = \frac{a}{2 \times b} \quad \Rightarrow \quad \frac{a}{b} = 1\ k\,cal\ mol^{-1}$

102.(A) Slope in high P region $= \frac{b}{RT} = \frac{2.2 - 2}{1200 - 1000} = \frac{0.2}{200} = 10^{-3}\,atm^{-1}$

103.(C) $Z = 2 = \frac{PV_m}{RT} \quad \Rightarrow \quad V_m = \frac{2RT}{P} = \frac{0.082 \times 200 \times 2L}{500} = 0.066\,L$

104.(A) $Z \approx 1$ for a large pressure range in low pressure region.

105.(C) For H_2, a is negligible.

So van der Waal equation is reduced to

$\therefore \quad P(V - b) = RT \quad \Rightarrow \quad PV - Pb = RT \quad \Rightarrow \quad Z = \frac{PV}{RT} = 1 + \frac{Pb}{RT}$