Assignment 4

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment.

1) A binary gas mixture contains 25 mol % A and 75 mol % B. At 50 bar total pressure and 100°C temperature, the fugacity coefficients of A and B in the mixture are, respectively, 0.65 and 0.9. What is the fugacity of the gaseous mixture?

- 18.2 bar
- 22.3 bar
- 41.5 bar
- 33.8 bar

No, the answer is incorrect. Score: 0
Accepted Answers: 41.5 bar

2) In a binary solution, if the molar volume of one of the components increases with concentration, the molar volume of the other:

- Constant
- Decreases
- Increases
- Do not change

No, the answer is incorrect. Score: 0
Accepted Answers: Decreases

3) Vapour pressures of acetone and acetonitrile are $P_1^{sat} = 85.12$ kPa and $P_2^{sat} = 39.31$ kPa. Estimate $x_1$ and $y_1$ at $P = 65$ kPa

- $x_1 = 0.7344$, $y_1 = 0.5608$
4) The molar density of water vapour at the normal boiling point of water is 33 mol/m$^3$. The compressibility factor, $z$, under these conditions is closest to:

- 0.75
- 1
- 1.5
- 1.75

No, the answer is incorrect.
Score: 0
Accepted Answers:

5) At 25°C and 1 bar partial pressure, the solubility of ethane in water is very small; the equilibrium mole fraction is $x_{C_2H_6} = 0.33 \times 10^{-4}$. At 25°C, the compressibility factor of ethane is given by the empirical relation $z = 1 - 7.63 \times 10^{-3} P - 7.22 \times 10^{-5} P^2$, where $P$ is in bar. What is the solubility of ethane at 25°C when the partial pressure is 35 bar? Given, at 25°C, the saturation pressure of ethane is 42.07 bar, and that of water is 0.0316 bar.

- $5.47 \times 10^{-4}$
- $6.47 \times 10^{-4}$
- $7.47 \times 10^{-4}$
- $8.47 \times 10^{-4}$

No, the answer is incorrect.
Score: 0
Accepted Answers:

6) The second virial coefficient of a certain gas is given by $B = b - a/T^2$, where $a$ and $b$ are constants. The change in internal energy for this gas in going from very low pressure to a pressure $\pi$, would be? Use the equation $z=PV/RT= 1 + BP/RT$

- $-2a\pi / T_0^2$
- $2a\pi / T_0^2$
- $-a\pi / T_0^2$
- $a\pi / T_0^2$

No, the answer is incorrect.
Score: 0
Accepted Answers:

7) At a given temperature and pressure, a liquid mixture of benzene and toluene is in equilibrium with its vapour. The available degrees of freedom is:

- 0
- 1
- 2
- 3

No, the answer is incorrect.
Score: 0
8) The system acetone(1)/acetonitrile(2)/nitromethane(3) at 353.15 K and 110 kPa has the overall composition of 0.45, 0.35 and 0.20 respectively. Assuming that Raoults law is applicable to the system, what would be the bubble point pressure (in kPa)?

- 120.4
- 132.4
- 144.4
- 150.4

No, the answer is incorrect.
Score: 0
Accepted Answers:
132.4

9) Let us consider a binary solution formed by two components 1 and 2. If $G_1^E$ is the excess Gibbs free energy of 1 at $x_1 = 0.3$ and $G_2^E$ is the excess Gibbs free energy of 2 at $x_2 = 0.5$, then what is the ratio between them (i.e. $G_1^E / G_2^E$). The activity of the above two components are given as 1.2 for component 1 and 1.5 for component 2.

- 1.56
- 1.24
- 1.15
- 3.34

No, the answer is incorrect.
Score: 0
Accepted Answers:
1.15

10) The necessary and sufficient condition for thermodynamic equilibrium between two phases is

- Concentration of each component should be the same in the two components
- The temperature of each phase should be same
- The pressure should be same in two phases
- The chemical potential of each component should be same in two phases

No, the answer is incorrect.
Score: 0
Accepted Answers:
The chemical potential of each component should be same in two phases