Unit 7 - Week 5

Assignment 5

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

Due on 2019-09-04, 23:59 IST.

1) *1 point*

When pressure, $P \rightarrow 0$, then the fugacity for a pure gas,

a. $f \rightarrow 0$
b. $f \rightarrow P$
c. $f \rightarrow \phi \times P$, where ϕ is the fugacity coefficient
d. $f \rightarrow P / \phi$

- a.
- b.
- c.
- d.

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

2) *1 point*

Poynting correction factor is given by

a. $\exp[\,V^c (P - P^{sat})\,]$
b. $\exp[\,(P - P^{sat}) / RT]$
c. $\exp[\{V^c (P - P^{sat})\} / RT]$
d. $\exp[\,V^c / RT]$

- a.
- b.
- c.
- d.

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

3) *1 point*

If f_i is the fugacity of a component, f_i^0 the fugacity of the same component at standard state, P_i the partial pressure of the component, then activity and fugacity coefficient are given respectively as,

a. $a_i = f_i/P_i \quad \phi_i = f_i/f_i^0$
b. $a = f_i \times f_i^0 \quad \phi = f_i \times P_i$
c. $a = f_i / f_i^0 \quad \phi_i = f_i / P_i$
d. $a = f_i \times P_i \quad \phi = f_i \times f_i^0$

- a.
- b.
- c.
- d.

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

4) *1 point*

At equilibrium in a biphasic mixture (α, β are phases),

a. $f^\alpha = f^\beta$
b. $f^\alpha = f^\beta = 0$
c. $f^\alpha = 1/f^\beta$
d. none of the above

- a.
- b.
- c.
- d.

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

5) *2 points*

Given $\varphi^0 = 0.8$, $\varphi^1 = 0.95$ and $\omega = 0.117$. Using 3-parameter model, find out the fugacity coefficient φ.

a. 0.795
b. 0.862
c. 0.898
d. 0.945

- a.
- b.
- c.
- d.

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

6) *2 points*

Match the following [P = pressure, T = temperature, z = compressibility factor, v = molar volume, y = mole fraction in gaseous phase, P_i = partial pressure of component i, R = universal gas constant, N = number of moles, Subscripts: c = critical point value, m = mixture value, i = component value]

1. Amagat's Law	(i) $P_{Cm} = \frac{R(\sum y_i z_{Ci}) T_{Cm}}{\sum y_i v_{Ci}}$
2. Dalton's Law	(ii) $z_m = \sum N_i z_i$
3. Kay's Rule	(iii) $z'_m = \sum y_i z'_i$
4. Prausnitz & Gunn Rule	(iv) $P_{Cm} = \sum y_i P_{Ci}$

a. 1-i, 2-ii, 3-iv, 4-iii
b. 1-ii, 2-i, 3-iv, 4-iii
c. 1-iv, 2-iii, 3-ii, 4-i
d. 1-ii, 2-iii, 3-iv, 4-i

- a.
- b.
- c.
- d.

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

7) *2 points*

Estimate the fugacity of propane at 333 K and 17.03 bar. The fugacity coefficient at these conditions is 0.809.

a. 17.03 bar
b. 15.67 bar
c. 13.78 bar
d. 10.09 bar

- a.
- b.
- c.
- d.

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

8) *5 points*

Assuming ammonia to obey an equation of state given by P (v-b) = RT, estimate the fugacity of ammonia at 15 bar and 100 K. [Given, $b = 3.707 \times 10^{-5}\ m^3/mol$]

a. 18.095 bar
b. 12.743 bar
c. 14.021 bar
d. 16.038 bar

- a.
- b.
- c.
- d.

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

9) *5 points*

Determine the fugacity of methane at 300 K and 40 bar using Lee – Kesler chart. [Given: $T_C = 190.7$ K, $P_C = 46.41$ bar, $\omega = 0.011$]

a. 27.06 bar
b. 38.87 bar
c. 45.03 bar
d. 51.56 bar

- a.
- b.
- c.
- d.

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

10) *5 points*

Estimate the molar volume of a mixture of 35 mole% propane and 65 mole% n-pentane at 600 K and 40 bar using Amagat's law.

COMPONENT	T_C (K)	P_C (bar)
Propane (1)	369.9	42.57
n- pentane (2)	469.8	33.75

a. $1.059 \times 10^{-3}\ m^3/mol$
b. $4.382 \times 10^{-4}\ m^3/mol$
c. $7.116 \times 10^{-4}\ m^3/mol$
d. $9.751 \times 10^{-4}\ m^3/mol$

- a.
- b.
- c.
- d.

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