Unit 9 - Week 7

Assignment 7

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

Due on 2019-09-18, 23:59 IST.

1) $(g^E/RT) = Ax_1x_2$ is the expression for *1 point*

a. Two suffix Margules equation
b. Van Laar equation
c. Wilson equation
d. NRTL equation

a.
b.
c.
d.

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

2) For azeotropes at boiling temperature, (x and y refer to the liquid and vapour phase compositions respectively of the component of interest) *1 point*

a. $x > y$
b. $x < y$
c. $x = y$
d. any of the above depending on boiling pressure

a.
b.
c.
d.

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

3) The molar excess Gibbs free energy (g^E) for a non-ideal solution is related to the activity coefficients of individual components by the expression *1 point*

a. $g^E = RT \Sigma (\ln \gamma_i)$
b. $g^E = R \Sigma (x_i \ln \gamma_i)$
c. $g^E = RT \Sigma (x_i \ln \gamma_i)$
d. $g^E = -R \Sigma (x_i \ln \gamma_i)$

a.
b.
c.
d.

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

4) Lewis – Randall rule for a non – ideal solution is expressed as [Given: f_i, x_i, and γ_i are the fugacity, mole fraction and activity coefficient (respectively) of component i in the solution, f_i^0 = fugacity of pure species at system pressure] *1 point*

a. $f_i = x_i f_i^0$
b. $f_i = \frac{\gamma_i}{x_i f_i^0}$
c. $f_i = \frac{x_i f_i^0}{\gamma_i}$
d. $f_i = \gamma_i x_i f_i^0$

a.
b.
c.
d.

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

5) The volume change of mixing for a real solution equals *2 points*

a. Excess volume of solution
b. Volume change of mixing for ideal solution
c. Half the excess volume of solution
d. Twice the volume change of mixing for ideal solution

a.
b.
c.
d.

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

6) *2 points*

Match the following

1. Maximum boiling azeotrope
2. Minimum boiling azeotrope

i. boiling point lower than those of components
ii. boiling point higher than those of components
iii. positive deviation from Raoult's law
iv. negative deviation from Raoult's law

a. 1 – iv, 2 – i, 1 – iii, 2 – ii
b. 1 – ii, 2 – iii, 1 – iv, 2 – i
c. 1 – iii, 2 – ii, 1 – i, 2 – iv
d. 1 – i, 2 – iv, 1 – ii, 2 – iii

a.
b.
c.
d.

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

7) The effects of temperature and pressure on activity coefficient are given by *2 points*

a. $\left(\frac{\partial \ln \gamma_i}{\partial T}\right)_{P,x_i} = \frac{\overline{h_i^E}}{RT^2}$ $\left(\frac{\partial \ln \gamma_i}{\partial P}\right)_{T,x_i} = -\frac{\overline{v_i^E}}{RT}$

b. $\left(\frac{\partial \ln \gamma_i}{\partial T}\right)_{P,x_i} = -\frac{\overline{h_i^E}}{RT^2}$ $\left(\frac{\partial \ln \gamma_i}{\partial P}\right)_{T,x_i} = \frac{\overline{v_i^E}}{RT}$

c. $\left(\frac{\partial \ln \gamma_i}{\partial T}\right)_{P,x_i} = -\frac{\overline{v_i^E}}{RT}$ $\left(\frac{\partial \ln \gamma_i}{\partial P}\right)_{T,x_i} = \frac{\overline{h_i^E}}{RT^2}$

d. $\left(\frac{\partial \ln \gamma_i}{\partial T}\right)_{P,x_i} = \frac{\overline{v_i^E}}{RT}$ $\left(\frac{\partial \ln \gamma_i}{\partial P}\right)_{T,x_i} = -\frac{\overline{h_i^E}}{RT^2}$

a.
b.
c.
d.

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

8) *5 points*

In a binary mixture of components 1 and 2, if the activity coefficient of component 1, γ_1 is given by $\ln \gamma_1 = Ax_2^2$, then obtain an expression for the activity coefficient of component 2, γ_2.

a. $\ln \gamma_2 = Ax_1x_2$
b. $\ln \gamma_2 = Ax_1x_2^2$
c. $\ln \gamma_2 = Ax_1$
d. $\ln \gamma_2 = Ax_1^2$

a.
b.
c.
d.

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

9) *5 points*

Liquids A & B form an azeotrope containing 46 mol% A at 101.3 kPa and 345 K. At 345 K, the vapor pressure of A is 84.8 kPa and that of B is 78.2 kPa. Calculate the constant of 2 suffix Margules equation.

a. A = 0.893
b. A = 3.038
c. A = 5.197
d. A = 8.449

a.
b.
c.
d.

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

10) *0 points*

The van Laar constants A and B for the system nitromethane (1) / carbon tetrachloride (2) at 45^{0}C are 2.230 and 1.959 respectively. Calculate the activity coefficients of the components in a solution containing 30 mol% nitromethane.

a. $\gamma_1 = 5.270$ $\gamma_2 = 3.93$
b. $\gamma_1 = 3.997$ $\gamma_2 = 2.604$
c. $\gamma_1 = 2.056$ $\gamma_2 = 1.44$
d. $\gamma_1 = 1.004$ $\gamma_2 = 0.42$

a.
b.
c.
d.

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