

Unit 10 - Week 8: Models for Activity Coefficients using Excess Gibbs Energy

Course outline

How does an NPTEL online course work?

Week 0: Prerequisite

Week 1: Introduction of Phase Equilibria

Week 2: Estimation of Thermodynamic Properties

Week 3: Potential Energy Functions and Intermolecular Forces

Week 4: Molecular Theory of Corresponding States

Week 5: Intermolecular Interactions and E.o.S

Week 6: Gaseous Mixtures and Fugacity

Week 7: Liquid Mixtures and Fugacity

Week 8: Models for Activity Coefficients using Excess Gibbs Energy

Lec 1: Models for Excess Gibbs Energy

Lec 2: Models for Excess Gibbs Energy - 2

Lec 3: Models for Excess Gibbs Energy - 3

Quiz : Assessment 8

Weekly feedback form for week 8

Lecture Notes: Week 8

Solution: Assignment 8

Week 9: Vapour - Liquid Equilibria of Multicomponent Non-Ideal Systems

Week 10: Liquid - Liquid Equilibria of Multicomponent Non-Ideal Systems

Week 11: Vapour - Liquid - Liquid Equilibria of Multicomponent Non-Ideal Systems

Week 12: Solid - Liquid Equilibria of Non-Ideal Systems

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Assessment 8

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

Due on 2020-03-25, 23:59 IST.

1) The van Laar constant A and B for the system of nitromethane (1) and CCl_4 (2) at 45°C are 2.230 and 1.959 respectively. Calculate the ratio between activity coefficients of nitromethane and carbon tetrachloride in the solution containing 30 mol % nitromethane. **4 points**

- 1.068
 5.876
 4.514
 2.218

No, the answer is incorrect.
Score: 0

Accepted Answers:
2.218

2) Wilson's parameters Λ_{12} and Λ_{21} for a system of nitromethane and carbon tetrachloride at 45°C are 0.1156 and 0.2879 respectively. Calculate the activity coefficients of nitromethane in solution if $x_1 = 0.3$. **4 points**

- 2.513
 4.219
 1.053
 3.894

No, the answer is incorrect.
Score: 0

Accepted Answers:
2.513

3) Wilson's parameters Λ_{12} and Λ_{21} for a system of nitromethane and carbon tetrachloride at 45°C are 0.1156 and 0.2879 respectively. Calculate the activity coefficients of CCl_4 in solution if $x_1 = 0.3$. **4 points**

- 3.741
 2.796
 4.643
 1.296

No, the answer is incorrect.
Score: 0

Accepted Answers:
1.296

4) For a binary solution if g^E is given as $\frac{g^E}{RT} = x_1x_2[A + B(x_1 - x_2)]$ then what is $\ln\left(\frac{\gamma_1}{\gamma_2}\right) = ?$ **6 points**

- $\frac{(A-3B)x_1^2 - 4Bx_1^3}{(A+3B)x_2^2 + 4Bx_2^3}$
 $\frac{(A+3B)x_1^2 + 4Bx_1^3}{(A-3B)x_2^2 - 4Bx_2^3}$
 $\frac{(A+3B)x_2^2 - 4Bx_2^3}{(A-3B)x_1^2 + 4Bx_1^3}$
 $\frac{(A-3B)x_2^2 - 4Bx_2^3}{(A+3B)x_1^2 + 4Bx_1^3}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
 $\frac{(A+3B)x_2^2 - 4Bx_2^3}{(A-3B)x_1^2 + 4Bx_1^3}$

5) In a binary mixture the activity coefficient of component "1" is given by: $R \ln \gamma_1 = Ax_2^2 + Bx_2^3$. This equation is valid in the entire range of composition. What is the activity of component "2"? **6 points**

- $R \ln \gamma_2 = \left(\frac{3A+2B}{2}\right)x_1^2 - Bx_1^3$
 $R \ln \gamma_2 = \left(\frac{2A+3B}{2}\right)x_1^2 - Bx_1^3$
 $R \ln \gamma_2 = \left(\frac{2A+3B}{2}\right)x_1^2 + Bx_1^3$
 $R \ln \gamma_2 = \left(\frac{2A-3B}{2}\right)x_1^2 - Bx_1^3$

No, the answer is incorrect.
Score: 0

Accepted Answers:
 $R \ln \gamma_2 = \left(\frac{2A+3B}{2}\right)x_1^2 - Bx_1^3$

6) For an isothermal binary solution, the activity coefficients are given as $\gamma_1 = 1 + Ax_2$ and $\gamma_2 = 1 + Bx_1$. Are these relations reliable? **6 points**

- Yes
 No
 Data insufficient to judge
 None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
No