

Unit 14 - Week 12: Solid - Liquid Equilibria of Non-Ideal Systems

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

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

Lec 1: Solid - Liquid Equilibrium

Lec 2: Solid - Liquid Equilibrium - 2

Quiz : Assessment 12

Weekly feedback form for week 12

Lecture Notes: Week 12

Solution: Assignment 12

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Assessment 12

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

Due on 2020-04-22, 23:59 IST.

1) In the case of solids, complete solid miscibility occurs only when species that are to be mixed are: 4 points

- Nearly the same size
- Have the same crystal structure
- Have similar electro-negativities and valences
- All of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
All of the above

2) In the phase diagram of pure solids a and b in equilibrium with liquid, which of the following two-phase regions are possible 4 points

- solid 'a' – solid 'b'
- solid 'b' – liquid
- solid 'a' – liquid
- All of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
All of the above

3) In the case of solid-liquid equilibrium, the lowest possible temperature at which liquid can exist is known as: 4 points

- Eutectic point
- Bubble point
- Dew point
- None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
Eutectic point

4) Temperature at which one liquid and two solid phases co-exist and at equilibrium is known as: 4 points

- Dew point temperature
- Bubble point temperature
- Eutectic point temperature
- None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
Eutectic point temperature

5) Freezing point of pure solid _____ by adding a little bit of other species to it. 4 points

- Increases
- Decreases
- Does not change
- None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
Decreases

6) Composition of pure solid – liquid equilibrium system can be estimated by using which of the following equation 4 points

- $\ln\left(\frac{x_i \gamma_i}{x_i^L \gamma_i^L}\right) = \frac{\Delta h_{fus} T_m}{R} \left\{ \frac{1}{T} - \frac{1}{T_{m_i}} \right\} + \frac{\Delta C_P^{\beta l}}{R} \left\{ 1 - \frac{T_{m_i}}{T} - \ln\left(\frac{T}{T_{m_i}}\right) \right\}$
- $\ln(x_i \gamma_i) = \frac{\Delta h_{fus} T_m}{R} \left\{ \frac{1}{T} - \frac{1}{T_{m_i}} \right\} + \frac{\Delta C_P^{\beta l}}{R} \left\{ 1 - \frac{T_{m_i}}{T} - \ln\left(\frac{T}{T_{m_i}}\right) \right\}$
- $\ln\left(\frac{x_i \gamma_i}{x_i^L \gamma_i^L}\right) = \frac{\Delta h_{fus} T_m}{R} \left\{ \frac{1}{T} - \frac{1}{T_{m_i}} \right\} + \frac{\Delta C_P^{\beta l}}{R} \left\{ 1 - \frac{T_{m_i}}{T} - \ln\left(\frac{T}{T_{m_i}}\right) \right\}$
- None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
 $\ln(x_i \gamma_i) = \frac{\Delta h_{fus} T_m}{R} \left\{ \frac{1}{T} - \frac{1}{T_{m_i}} \right\} + \frac{\Delta C_P^{\beta l}}{R} \left\{ 1 - \frac{T_{m_i}}{T} - \ln\left(\frac{T}{T_{m_i}}\right) \right\}$

7) Composition of partially miscible solid – liquid equilibrium system can be estimated by using which of the following equation 4 points

- $\ln\left(\frac{x_i \gamma_i}{x_i^L \gamma_i^L}\right) = \frac{\Delta h_{fus} T_m}{R} \left\{ \frac{1}{T} - \frac{1}{T_{m_i}} \right\} + \frac{\Delta C_P^{\beta l}}{R} \left\{ 1 - \frac{T_{m_i}}{T} - \ln\left(\frac{T}{T_{m_i}}\right) \right\}$
- $\ln(x_i \gamma_i) = \frac{\Delta h_{fus} T_m}{R} \left\{ \frac{1}{T} - \frac{1}{T_{m_i}} \right\} + \frac{\Delta C_P^{\beta l}}{R} \left\{ 1 - \frac{T_{m_i}}{T} - \ln\left(\frac{T}{T_{m_i}}\right) \right\}$
- $\ln\left(\frac{x_i \gamma_i}{x_i^L \gamma_i^L}\right) = \frac{\Delta h_{fus} T_m}{R} \left\{ \frac{1}{T} - \frac{1}{T_{m_i}} \right\} + \frac{\Delta C_P^{\beta l}}{R} \left\{ 1 - \frac{T_{m_i}}{T} - \ln\left(\frac{T}{T_{m_i}}\right) \right\}$
- None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
 $\ln\left(\frac{x_i \gamma_i}{x_i^L \gamma_i^L}\right) = \frac{\Delta h_{fus} T_m}{R} \left\{ \frac{1}{T} - \frac{1}{T_{m_i}} \right\} + \frac{\Delta C_P^{\beta l}}{R} \left\{ 1 - \frac{T_{m_i}}{T} - \ln\left(\frac{T}{T_{m_i}}\right) \right\}$

8) When a species 'b' sits in interstitial spaces in between lattice sites where 'a' sits, then such type of solid solution formation is known as: 4 points

- Substitutional solid solution
- Interstitial solid solution
- Combined interstitial and substitutional solid solution
- None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
Interstitial solid solution

9) When a species 'b' occupies the lattice sites where species 'a' once sat, then such type of solid solution formation without altering basic structure of species 'a' is known as: 4 points

- Substitutional solid solution
- Interstitial solid solution
- Combined interstitial and substitutional solid solution
- None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
Substitutional solid solution

10) Molybdenum and tungsten can mix in all proportion because 4 points

- The species are similar in size (2.72 Å & 2.73 Å)
- Chemically similar nature (both in Group VIb of periodic table)
- Both form body centre cubic crystal lattices
- All of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
All of the above