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NPTEL

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Courses » Fundamentals of Material Processing - I

Announcements **Course** Ask a Question Progress

Unit 5 - week 4



Course outline

How to access the portal

Week 1

Week 2

week 3

week 4

- Lecture 16 - Complete and Limited Liquid Diffusion
- Lecture 17 - Mixed Mode Solidification
- Lecture 18 - Mixed Mode Solidification and Zone Refining
- Lecture 19 - Zone Refining continued...
- Lecture 20 - Cellular Solidification of Single Phase Alloy
- Quiz : Assignment-4
- Assignment 4 Solution

week 5

week 6

week 7

week 8

Assignment-4

The due date for submitting this assignment has passed. **Due on 2017-08-20, 23:59 IST**
As per our records you have not submitted this assignment.

1) Scheil's equation is valid under following assumption(s):

- A. No solid diffusion
- B. Complete homogenization in liquid
- C. Constant partition ratio K

- All A, B and C are true
- A and B are true, but C is not true
- Only A is true
- Only C is true

No, the answer is incorrect.

Score: 0

Accepted Answers:

All A, B and C are true

2) For the condition of no solid diffusion, limited liquid diffusion, which of the following are true? **1 point**

- A. Composition of the initial solid formed is given by KC_0
- B. If crystal is sufficiently long and hence steady state can be assumed, then composition of solid in steady state region must be C_0
- C. Composition of liquid at the interface in steady state regime is C_0/K
- D. Overall composition of the solid formed under this condition is C_0

- All A, B, C and D are true
- A and B are true, but C and D are false
- A, B and C are true, but D is false
- Only A is true

No, the answer is incorrect.

Score: 0

Accepted Answers:

All A, B, C and D are true

3) The steady state region of the case of 'no solid diffusion, limited liquid diffusion' can be expressed by following differential equation: **1 point**

What boundary conditions are needed to solve this differential equation?

- A. $C_L(C_i) = C_0$ at $x = \infty$
- B. $C_L(C_i) = C_0/K$ at $x = 0$
- C. $C_S = C_0$ (for all x in steady state regime)

- Only A is needed
- Only B is needed

- All A, B and C are needed
- B and C are needed, but not A

No, the answer is incorrect.

Score: 0

Accepted Answers:

All A, B and C are needed

4) Regarding mixed mode of solidification, which one of the following is correct statement? **1 point**

- Solid diffusion with some convection in liquid
- No Solid diffusion with some convection in liquid
- Solid diffusion without any convection in liquid
- No Solid diffusion with significant convection in liquid

No, the answer is incorrect.

Score: 0

Accepted Answers:

No Solid diffusion with some convection in liquid

5) For the mixed mode solidification, which of the boundary conditions are needed? **1 point**

- A. $C_L(C_i) = C_\infty$ at $x = \delta$
- B. $C_L(C_i) = C_L^* = C_S^*/K$ at $x = 0$
- C. $C_L(C_i) = C_0$ at $x = \infty$

- A and B are needed, not C
- All A, B and C are needed
- Neither of A, B and C are needed
- Only C is needed, not A and B

No, the answer is incorrect.

Score: 0

Accepted Answers:

A and B are needed, not C

6) What is the expression of effective partition between solid and alloy for mixed mode of solidification? **1 point**

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-
-
-

No, the answer is incorrect.

Score: 0

Accepted Answers:

7) Write down the expression for effective partition for the case of 'no solid diffusion, complete homogenization in liquid'? **1 point**

- $K_{\text{effective}} = -K$
- $K_{\text{effective}} = K$
- $K_{\text{effective}} = -1/K$
- $K_{\text{effective}} = 1/K$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$K_{\text{effective}} = K$

8) The objective of zone refining is to **1 point**

- increase the solute concentration in the solid

- decrease the solute concentration in the solid
- increase the solute concentration in the liquid
- decrease the solute concentration in the liquid

No, the answer is incorrect.

Score: 0

Accepted Answers:

decrease the solute concentration in the solid

9) In single phase alloys, which of the following is true?

- A. Random fluctuations cause growth of protrusions on the solid-liquid interface
- B. If the thermal gradient in the liquid is positive, protrusions melt and vanish
- C. If the thermal gradient in the liquid is negative, planar interface of growth is observed

- A and B are true, not C
- All A, B and C are true
- Only C is true, not A and B
- A and C are true, not B

No, the answer is incorrect.

Score: 0

Accepted Answers:

A and B are true, not C

10) For constitutional supercooling, slope of actual thermal gradient should be always _____

- lower than that of critical thermal gradient
- greater than that of critical thermal gradient
- equal to that of critical thermal gradient
- does not depend on actual thermal gradient

No, the answer is incorrect.

Score: 0

Accepted Answers:

lower than that of critical thermal gradient



Previous Page

End

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