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Courses » Fundamentals of Material Processing - I

Announcements Course Ask a Question Progress



## Unit 3 - Week 2

### Course outline

How to access the portal

#### Week 1

#### Week 2

- Lecture 06 - Kinetics of Solidification (Heterogeneous)
- Lecture 07- Heat Flow
- Lecture 08 - Heat Flow continued...
- Lecture 09 - Heat Flow (Insulating Mold Condition)
- Lecture 10 - Heat Flow (Insulating Mold Condition) continued...
- Quiz : Assignment-2
- Assignment 2 Solution

#### week 3

#### week 4

#### week 5

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#### week 8

## Assignment-2

The due date for submitting this assignment has passed. **Due on 2017-08-09, 23:59 IST**  
As per our records you have not submitted this assignment.

1) For solidification, cooling the liquid below its melting point is \_\_\_\_\_ 1 point

- Sufficient, but not necessary condition
- Necessary and sufficient condition
- Neither necessary and nor sufficient condition
- Necessary, but not sufficient condition

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*Necessary, but not sufficient condition*

2) Which of the following is true regarding homogeneous nucleation? 1 point

- With increasing undercooling, nucleation rate decreases
- With increasing undercooling (lowering of temperature), critical size of the nucleus decreases
- With increasing undercooling, homogeneous nucleation becomes less and less probable
- With increasing undercooling,  $\Delta G^*$  increases

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*With increasing undercooling (lowering of temperature), critical size of the nucleus decreases*

3) Heterogeneous nucleation is much easier to occur because \_\_\_\_\_ 1 point

- the surface energy term is much smaller during heterogeneous nucleation
- volume energy term is much higher during heterogeneous nucleation
- the surface energy term is much higher during heterogeneous nucleation
- volume energy term is much lower during heterogeneous nucleation

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*the surface energy term is much smaller during heterogeneous nucleation*

4) Heterogeneous nucleation rate can be expressed by \_\_\_\_\_ 1 point

- $N_{het.} = n_1 \cdot \exp(\Delta G^*/K.T)$
- $N_{het.} = f_1 n_1 \cdot \exp(-\Delta G^*/R.T)$
- $N_{het.} = f_1 n_1 \cdot \exp(\Delta G^*/T)$
- $N_{het.} = f_1 n_1 \cdot \exp(-\Delta G^*/K.T)$

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

$$N_{het.} = f_1 n_1 \cdot \exp(-\Delta G^*/K.T)$$

5) What is the heat balance equation for liquid-solid interface? 1 point

- $K_S - K_L = \rho_S HRT$
- $K_S G_S - K_L G_L = \rho_S RT$
- $K_S G_S - K_L G_L = \rho_S HR$
- $K_S G_S - K_L G_L = \rho_S 2RT$

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

$$K_S G_S - K_L G_L = \rho_S HR$$

6) What is the unit of thermal gradient? 1 point

- $\text{cal/cm}^2 \cdot ^\circ\text{C}$
- $\text{cal} \cdot ^\circ\text{C/cm}$
- $\text{cal/cm} \cdot ^\circ\text{C}$
- $\text{cal.cm} \cdot ^\circ\text{C}$

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

$$\text{cal/cm} \cdot ^\circ\text{C}$$

7) During solidification of casting and ingots, total heat that needs to be taken out of the liquid for solidification, includes \_\_\_\_\_ 1 point

- Only the heat of fusion
- Heat of fusion + heat given out by solidifying liquid
- Heat of fusion + heat given out by solidifying liquid + extra heat in the liquid (called superheat)
- Heat of fusion + extra heat in the liquid (called superheat)

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*Heat of fusion + extra heat in the liquid (called superheat)*

8) For semi-infinite insulating mold condition, the plot between S and  $\sqrt{t}$  is \_\_\_\_\_ 1 point

- Parabolic
- Elliptical
- Linear
- Asymptotic

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*Linear*

9) The plot shows temperature versus position for various time. Under what assumption of mold, you will get such cooling curves? 1 point

- Semi-infinite insulating mold
- Fixed outside temperature of the mold
- Non-insulating mold
- Steady state heat flow

**No, the answer is incorrect.**

**Score: 0**



**Accepted Answers:**

*Fixed outside temperature of the mold*

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