

## Unit 5 - Solid Solutions & Structures

### Course outline

#### How to access the portal?

#### Introduction to Materials

#### Introduction to Crystallography

#### Structures of Materials

#### Solid Solutions & Structures

- Lecture 16: Interstices, Solid Solutions & Alloys
- Lecture 17: Solid Solutions: Alloys
- Lecture 18: Solid Solutions: Alloy (contd.)
- Lecture 19: Covalent Solids
- Lecture 20: Covalent Solids (contd.) & Ionic Solids

#### Quiz : Assignment-4

#### Feedback Form 4

#### Assignment-4: Solution

#### Classification of Ionic Solids

#### Non-Crystalline Solids

#### Structure Determination

#### Imperfections in Solids

#### Week-0

## Assignment-4

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

**Due on 2019-09-25, 23:59 IST.**

- 1) Following is NOT a Hume-Ruthery condition: 1 point
- Crystal structure of each element of solid solution must be the same.
  - Elements should form compounds with each other.
  - Size of atoms of each two elements must not differ by more than 15%.
  - Elements should have the same valence.
- No, the answer is incorrect.**  
**Score: 0**  
**Accepted Answers:**  
*Elements should form compounds with each other.*
- 2) In a face centered cubic (FCC) lattice, tetrahedral voids are located on the: 1 point
- edge centers.
  - Face centers.
  - body centers.
  - body diagonals.
- No, the answer is incorrect.**  
**Score: 0**  
**Accepted Answers:**  
*body diagonals.*
- 3) In body centered cubic (BCC) lattice, possible location of tetrahedral voids are: 1 point
- (1/2,1/2,0)
  - (1/2, 0, 0)
  - (1/2, 1/4, 0)
  - (1/2, 0, 1/4)
- No, the answer is incorrect.**  
**Score: 0**  
**Accepted Answers:**  
*(1/2, 1/4, 0)*  
*(1/2, 0, 1/4)*
- 4) Crystal structure of Silicon can be defined as: 1 point
- FCC lattice, Motif: Si [000,1/4 1/4 1/4]
  - FCC lattice, Motif: Si [000,1/2 1/2 1/2]
  - BCC lattice, Motif: Si [000,1/4 1/4 1/4]
  - BCC lattice, Motif: Si [000,1/2 1/2 1/2]
- No, the answer is incorrect.**  
**Score: 0**  
**Accepted Answers:**  
*FCC lattice, Motif: Si [000,1/4 1/4 1/4]*
- 5) A metal with cubic closed packed structure has a lattice parameter of 3.5Å. The size of octahedral interstitial that can fit without displacing the host atoms is: 1 point
- 0.627 Å
  - 0.341 Å
  - 0.278 Å
  - 0.51 Å
- No, the answer is incorrect.**  
**Score: 0**  
**Accepted Answers:**  
*0.51 Å*
- 6) Upon mixing of two atoms, whether substitutional solid solution formed is random or ordered will be governed by minimization of: 1 point
- Gibbs Free Energy
  - Entropy of mixing only
  - Enthalpy of mixing only
  - Internal Energy
- No, the answer is incorrect.**  
**Score: 0**  
**Accepted Answers:**  
*Gibbs Free Energy*
- 7) Crystal structure of ordered form of Ni<sub>3</sub>Al, an intermetallic, is 1 point
- Face Centered Cubic
  - Body Centered Cubic
  - Diamond Cubic
  - Simple Cubic
- No, the answer is incorrect.**  
**Score: 0**  
**Accepted Answers:**  
*Simple Cubic*
- 8) Consider a substitutional solid solution with host atom(A) of radius 1.26 Å and the substitutional impurity atom (B) of radius 1.10 Å. What is likely to happen? 1 point
- Compressive stress will be generated
  - Tensile stress will be generated
  - Volume will decrease
  - Volume will increase
- No, the answer is incorrect.**  
**Score: 0**  
**Accepted Answers:**  
*Tensile stress will be generated*  
*Volume will decrease*
- 9) Which of following form interstitial solid solution? 1 point
- Brasses
  - Bronzes
  - Steels
  - Pb-Sn alloys
- No, the answer is incorrect.**  
**Score: 0**  
**Accepted Answers:**  
*Steels*
- 10) Which of the following materials does not form diamond cubic structure? 1 point
- Silicon (Si)
  - Graphite (C)
  - Carborundum (SiC)
  - Zinc Sulfide (ZnS)
- No, the answer is incorrect.**  
**Score: 0**  
**Accepted Answers:**  
*Graphite (C)*
- 11) The sp<sup>3</sup> hybrid orbitals adopt what kind of geometry? 1 point
- Linear
  - Trigonal planar
  - Octahedral
  - Tetrahedral
- No, the answer is incorrect.**  
**Score: 0**  
**Accepted Answers:**  
*Tetrahedral*
- 12) In a hexagonal closed packed lattice, the number of tetrahedral voids per atom are: 1 point
- 4
  - 3
  - 2
  - 1
- No, the answer is incorrect.**  
**Score: 0**  
**Accepted Answers:**  
*2*
- 13) Among the following compounds, which is likely to have highest ionic bond character? 1 point
- MgO
  - ZnO
  - FeO
  - CuO
- No, the answer is incorrect.**  
**Score: 0**  
**Accepted Answers:**  
*MgO*
- 14) Graphite is used as a lubricant because layers can slide against each other. The bond between the layers is: 1 point
- Hydrogen Bond
  - Van der Waals Bond
  - Ionic Bond
  - Covalent Bond
- No, the answer is incorrect.**  
**Score: 0**  
**Accepted Answers:**  
*Van der Waals Bond*
- 15) Which of the following material(s) exhibit sp<sup>3</sup> hybridization? 1 point
- C (Diamond)
  - SiC
  - Fullerene (C<sub>60</sub>)
  - C (Graphite)
- No, the answer is incorrect.**  
**Score: 0**  
**Accepted Answers:**  
*C (Diamond)*  
*SiC*