Unit 3 - Week 1

Course outline

How does an NPTEL online course work?

Week 0

Week 1

- Introduction
- Material Property Landscape
- Crystal Structure - 1 (Platonic Solids)
- Crystal Structure - 2 (Unit Cell, Lattice, Crystal)
- Crystal Structure - 3 (Bravais lattice, Symmetry in Crystals)
- Crystal Structure - 4 (Miller Indices for Crystallographic Points and Directions)
- Crystal Structure - 5 (Miller-Brvais Indices, Linear and Planar Density)
- Quiz : Assignment 1
- Week 1 Lecture material
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Assignment 1

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

Due on 2020-09-30, 23:59 IST.

1) The effective number of atoms per unit cell in a BCC crystal lattice is _____

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Numeric) 2

1 point

2) The effective number of atoms per unit cell in an FCC crystal lattice is _____

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Numeric) 4

1 point

3) The ideal c/a ratio for HCP crystal structure is _____

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 1.630,1.635

1 point

4) If the electronegativity values of Titanium and Oxygen are 1.5 and 3.4, respectively,the percentage ionic character of TiO_2 compound is _____ %

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 59,60

2 points

5) The table below shows the atomic weight, density, and atomic radius for two hypothetical alloys. ***4 points***

Alloy	Atomic weight (g/mol)	Density (g/cm^3)	Atomic radius (nm)
A1	43.1	6.4	0.122
A2	184.4	12.3	0.146

The density (ρ) is given by

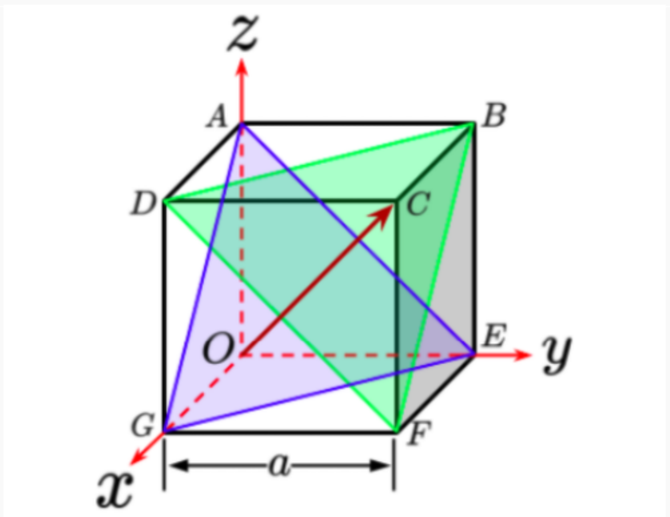
$$\rho = \frac{nA}{VN_A},$$

where n is the number of atoms, A is the atomic weight, V is the volume of the unit cell, and $N_A = 6.022 \times 10^{23} atoms/mol$ is the Avagadro's number. For the two alloys given below the crystal structure is

- A1 - Simple Cubic; A2 - BCC
- A1 - BCC; A2 - Simple Cubic
- A1 - BCC; A2 - FCC
- A1 - FCC; A2 - BCC

No, the answer is incorrect.
Score: 0
Accepted Answers:
A1 - BCC; A2 - Simple Cubic

6) Based on the unit cell of a crystal shown in the figure below, which of the below Miller- Index representation is true? ***1 point***



- Plane AGE: [111]
- Crystallographic direction OC: [111]
- Family of equivalent crystallographic planes: < 111 >
- Crystallographic point C: (111)

No, the answer is incorrect.
Score: 0
Accepted Answers:
Crystallographic direction OC: [111]

7) A regular solid formed by 5 regular triangles meeting at one vertex is called ***1 point***

- Dodecahedron
- Icosahedron
- Octahedron
- Such a solid is not possible

No, the answer is incorrect.
Score: 0
Accepted Answers:
Icosahedron

8) Identify the invalid Bravais lattice systems from the options given below. ***1 point***

- Body centered triclinic
- Face centered orthorhombic
- Body centered cubic
- End centered tetragonal

No, the answer is incorrect.
Score: 0
Accepted Answers:
Body centered triclinic
End centered tetragonal

9) A crystal system with three 2-fold axis of symmetry is known as ***1 point***

- Orthorhombic
- Cubic
- Tetragonal
- Monoclinic

No, the answer is incorrect.
Score: 0
Accepted Answers:
Orthorhombic

10) The Miller index representation for body centered atom in a BCC unit cell is ***1 point***

- $< 222 >$
- 222
- $\frac{1}{2}\frac{1}{2}\frac{1}{2}$
- $< \frac{1}{2}\frac{1}{2}\frac{1}{2} >$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\frac{1}{2}\frac{1}{2}\frac{1}{2}$

11) The Miller index representation of a crystallographic direction [101] in a HCP system can be represented with Miller-Brvais representation as ***1 point***

- $[2\bar{1}13]$
- $[2\bar{1}\bar{1}3]$
- $[2\bar{1}\bar{1}1]$
- $[21\bar{1}1]$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$[2\bar{1}\bar{1}3]$