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NPTEL

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Courses » Solid State Chemistry

Announcements

Course

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Unit 11 - Week 8 : X-ray Diffraction and Concepts related to X-ray Diffraction

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Course outline

How to access
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Practice

Week 1 : Solid
State And Solid
State Materials

Week 2 Unit
Cells And
Lattices

Week 3 :
Symmetry In
Crystals Part 1

Week 4 :
Symmetry in
Crystals Part 2

Week 5 : Crystal
Systems, Point
Groups and
Space Groups

Week 6 :
Crystallographic
Notations

Week 7 :
Coordination
number, voids,
defects in

Assignment 8

The due date for submitting this assignment has passed.

As per our records you have not submitted this assignment. **Due on 2019-03-27, 23:59 IST.**

1) For a cubic unit cell, the symbol $\langle 110 \rangle$ represents **1 point**

A Miller plane with intercepts 1, 1, ∞ along X,Y and Z axes respectively.

A direction along the vector $\hat{i} + \hat{j}$

The family of equivalent directions along $\hat{i} + \hat{k}$, $\hat{j} + \hat{k}$ and $\hat{i} + \hat{k}$

A direction along \hat{k}

No, the answer is incorrect.

Score: 0

Accepted Answers:

The family of equivalent directions along $\hat{i} + \hat{k}$, $\hat{j} + \hat{k}$ and $\hat{i} + \hat{k}$

2) For a triclinic cell, the symbol $\{100\}$ represents **1 point**

The Miller plane (100)

The family of Miller planes (100), (010) and (001)

The direction along the first crystallographic axis \vec{a}_1

The family of directions along the three crystallographic axes

No, the answer is incorrect.

Score: 0

Accepted Answers:

The family of Miller planes (100), (010) and (001)

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Concepts related to X-ray Diffraction

- Lecture 36 : Miller Planes, Miller Indices
- Lecture 37 : Miller Indices for Hexagonal Systems, Distance between Planes
- Lecture 38 : X-ray diffraction, Bragg's Law, Reciprocal Lattice
- Lecture 39 : Reciprocal Lattice, XRD instrumentation
- Lecture 40 : Review of week 8, Practice Problems
- Quiz : Assignment 8
- Feedback For Week 8
- Assignment 8 Solution

Week 9 : X - Ray Diffraction, X - Ray Crystallography & Electron Microscopy
Week 10 : Common Crystal Structures
Week 11 : Theory of Electronic Structure of Solids
Interaction Session
Week 12 : Theory of Electronic Structure of Solids, Part 2

ce De

 The Miller indices for this plane are (11∞)
 The informaion given cannot be correct

No, the answer is incorrect.

Score: 0

Accepted Answers:

The informaion given cannot be correct

4) In a hexagonal system, the Miller planes (001) and (0001) are

1 point

 the same plane

 two different planes unrelated to each other

 two different planes related to each other by 120 degree rotation

 two different planes related to each other by 60 degree rotation

No, the answer is incorrect.

Score: 0

Accepted Answers:

the same plane

5)

1 point

For a hexagonal sytem, the planes, $(10\bar{1}2)$ and $(\bar{1}102)$ are





- two planes that are not related to each other by symmetry
- two planes that are equivalent to each other due to the hexagonal symmetry
- two planes that are parallel to each other
- two planes that are perpendicular to each other

No, the answer is incorrect.

Score: 0

Accepted Answers:

two planes that are equivalent to each other due to the hexagonal symmetry

- 6) Of the planes in a cubic system (221), (222), (311) and (301), the Miller planes with the smallest interplanar distance is

1 point

- (221)
- (222)
- (311)
- (310)

No, the answer is incorrect.

Score: 0

Accepted Answers:

(222)

- 7) Consider lattice with lattice translation vectors given $a/2(\hat{i} + \hat{j} - \hat{k})$, $a/2(\hat{j} + \hat{k} - \hat{i})$ and $a/2(\hat{k} + \hat{i} - \hat{j})$. The reciprocal lattice for this lattice is

1 point

- a BCC lattice of size $2\pi/a$
- an FCC lattice of size $2\pi/a$
- an FCC lattice of size π/a
- none of the other choices

No, the answer is incorrect.

Score: 0

Accepted Answers:

none of the other choices

- 8) A certain crystal has unit cell made up of the vectors $a\hat{i}$, $-a/2\hat{i} + a\sqrt{3}/2\hat{j}$ and $c\hat{k}$. The volume of the cell formed by the reciprocal lattice translation vectors is equal to

1 point

- $\frac{8\pi^3}{a^2c}$
- $\frac{16\pi^3}{a^2c}$
- $\frac{8\pi^3}{a^2c\sqrt{3}}$
- None of the other choices

No, the answer is incorrect.

Score: 0

Accepted Answers:

None of the other choices

9) The angle between Miller planes (120) and (210) in a cubic system is (in degrees) **1 point**

- 0
- 90
- 45
- None of the other choices



No, the answer is incorrect.

Score: 0

Accepted Answers:

None of the other choices

10) A certain crystal is observed to show a peak at $\theta = 32.7$ degrees in an XRD pattern when XRay radiation of wavelength 1.5418 Angstroms is used. The crystal is known to be a cubic lattice of side 3.19 Angstroms. The Miller indices of the lattice planes corresponding to the observed peak angle are **1 point**

- (111)
- (110)
- (210)
- None of the other choices

No, the answer is incorrect.

Score: 0

Accepted Answers:

(210)

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