X

NPTEL

**Courses** » **Solid State Chemistry**

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# Unit 12 - Week 9 : X - Ray Diffraction, X - Ray Crystallography & Electron Microscopy

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## Course outline

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**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**

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## Assignment 9

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

**Due on 2019-04-03, 23:59 IST.**

1) In the Patterson method, the peaks in the electron density map correspond to        **1 point**

○ locations of the atoms

○ distances between atoms

○ valence electrons in a crystal

○ conduction electrons in a crystal

**No, the answer is incorrect.**
**Score: 0**

**Accepted Answers:**
*distances between atoms*

2) In an XRD pattern using Cu K$\alpha$ radiation, a certain cubic crystal shows peaks at $2\theta$ values **1 point** (in degrees) of 44.3, 64.4, 81.6, 98.0. It is known that the size of the cubic crystal is greater than 2.5 Angstroms. Based on this information and the location of the peaks, we conclude that the lattice of the crystal is

○ simple cubic

○ face centered cubic

○ body centered cubic

○ none of the other choices

**No, the answer is incorrect.**
**Score: 0**

**Accepted Answers:**

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○ (200)

**No, the answer is incorrect.**
**Score: 0**

**Accepted Answers:**
*(200)*

4) For the structure determination of a protein crystal, the number of peaks required is typically in the range of          **1 point**

○ 10

○ 50

○ 200

○ 5000

**No, the answer is incorrect.**
**Score: 0**

**Accepted Answers:**
*5000*

5)          **1 point**

Cs Cl can be considered as a a simple cubic lattice of chloride ions with the caesium ion at the body center. Assume that $f_{Cs}$ and $f_{Cl}$ represent the atomic form factors of Cs and Cl respectively. The geometric structure factor for scattering from the (110) plane is equal to

○ $f_{Cs} + f_{Cl}$

○ $f_{Cs} - f_{Cl}$

○ 0

○ None of the other choices

**No, the answer is incorrect.**
**Score: 0**

**Accepted Answers:**
$f_{Cs} + f_{Cl}$

6) Consider the zinc blende structure. Assume that $f_{Zn}$ and $f_S$ represent the atomic form factors for zinc and sulphur atoms respectively. The structure factor for scattering from the (121) Miller plane is equal to          **1 point**

○ $f_{Zn} - f_S$

○ $4(f_{Zn} + f_S)$

○ $4(f_{Zn} - f_S)$

○ 0

**No, the answer is incorrect.**
**Score: 0**

**Accepted Answers:**
*0*

7) The atomic form factor for an atom in a crystal is related to          **1 point**

○ the atomic mass

○ the atomic number

○ the coordination number of the atom in the crystal

○ the number of atoms in the basis of the crystal

**No, the answer is incorrect.**
**Score: 0**

**Accepted Answers:**
*the atomic number*

8) The intensity of the XRD peaks at high temperature is          **1 point**

○ greater than at low temperature

○ smaller than at low temperature.

○ the same as that at low temperature. There is no temperature dependence in the XRD intensities.

○ unrelated to that at low temperature. It can be higher, lower or equal depending on the crystal.

**No, the answer is incorrect.**
**Score: 0**

**Accepted Answers:**
*smaller than at low temperature.*

9) KCl also crystallizes in NaCl structure. The atomic form factors of potassium and chloride ion are identical. On indexing the XRD pattern for KCl, we will conclude that KCl is a    *1 point*

○ simple cubic crystal

○ face centered cubic crystal

○ body centered cubic crystal

○ None of the other choices

**No, the answer is incorrect.**
**Score: 0**

**Accepted Answers:**
*simple cubic crystal*

10) The wavelength of electrons (in Angstroms) accelerated by 40 kV is closest to    *1 point*

○ 0.006

○ 0.06

○ 0.6

○ 6.0

**No, the answer is incorrect.**
**Score: 0**

**Accepted Answers:**
*0.06*

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