

Course outline

How does an NPTEL online course work?

Week 1

Week 2

- Brillouin zones for bcc and fcc lattice
- Fourier analysis of the basis and structure factor
- Atomic form factor
- Van der Waals attraction
- Repulsive interaction
- Equilibrium lattice constant and cohesive energy
- Ionic crystals
- Evaluation of the Madelung constant
- Covalent crystals: Linear combination of atomic orbitals
- Week 2 Feedback Form: Solid State Physics

 Quiz: Week 2: Assignment 2

Week 3

Week 4

Week 5

Week 6

Week 7

Week 8

DOWNLOAD VIDEOS

Lecture notes

Solutions

Week 2: Assignment 2

The due date for submitting this assignment has passed.

Due on 2021-09-08, 23:59 IST.

As per our records you have not submitted this assignment.

Packing fraction

Assuming atoms represented by the largest possible sphere, find the packing fraction for:

 1) a crystal represented by a body centered cubic lattice and a one-atom basis **2 points**

- 65%
 68%
 74%
 34%

No, the answer is incorrect.

Score: 0

Accepted Answers:

68%

 2) a crystal represented by a face centered cubic lattice and a one-atom basis **2 points**

- 65%
 68%
 74%
 34%

No, the answer is incorrect.

Score: 0

Accepted Answers:

74%

 3) a crystal represented by a face centered cubic lattice and a two-atom basis, atoms located at (0, 0, 0) and (0.25, 0.25, 0.25). **3 points**

- 65%
 68%
 74%
 34%

No, the answer is incorrect.

Score: 0

Accepted Answers:

34%

X-ray Diffraction

 4) Determine the maximum wavelength for which constructive interference can be observed in the Bragg model for a simple cubic crystal with a lattice constant of 3.6 Å. (use condition of maxima, $h = 6.626 \times 10^{-34}$, $m_n = 1.675 \times 10^{-27}$) **2 points**

- 7.0Å
 7.2Å
 7.4Å
 7.8Å

No, the answer is incorrect.

Score: 0

Accepted Answers:

7.2Å

 5) What is the energy of the X-ray in eV? (use the value obtained above,) **2 points**

- 1.7keV

 2.0keV

 3.4keV

 4.2keV

No, the answer is incorrect.

Score: 0

Accepted Answers:

1.7keV

 6) If you were to perform neutron diffraction, what would the energy of the neutrons have to be in order to obtain the same de Broglie wavelength (as obtained in part a)? **3 points**

- 8.18×10^{-2}
 0.16×10^{-2}
 2.34×10^{-2}
 4.68×10^{-2}

No, the answer is incorrect.

Score: 0

Accepted Answers:

 0.16×10^{-2}