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Courses » Solid State Chemistry

Announcements

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## Unit 5 - Week 3 : Symmetry In Crystals Part 1

Register for  
Certification exam

### Course outline

How to access  
the portal

Practice

Week 1 : Solid  
State And Solid  
State Materials

Week 2 Unit  
Cells And  
Lattices

Week 3 :  
Symmetry In  
Crystals Part 1

- Lecture 11 :  
Symmetry In  
Crystals, Point  
Symmetries
- Lecture 12 :  
Reflections,  
Inversions and  
Rotoinversions
- Lecture 13 :  
Schonflies and  
Hermann-  
Mauguin  
Conventions
- Lecture 14:  
Fractional  
Coordinates,  
Planer  
Visualization
- Lecture 15  
Review of week

### Assignment 3

The due date for submitting this assignment has passed.

As per our records you have not submitted this assignment. **Due on 2019-02-20, 23:59 IST.**

1) In the Hermann- Mauguin convention, the rotation symmetry of highest order in a diamond cubic lattice corresponds to **1 point**

4

$\bar{4}$

6

$\bar{6}$

No, the answer is incorrect.

Score: 0

Accepted Answers:

4

2) The number of 4-fold rotation axes in an FCC lattice is **1 point**

3

4

6

12

No, the answer is incorrect.

Score: 0

Accepted Answers:

3

3) Among the Bravais lattices below, the one that DOES NOT possess a centre of inversion is **1 point**

triclinic

face centred cubic

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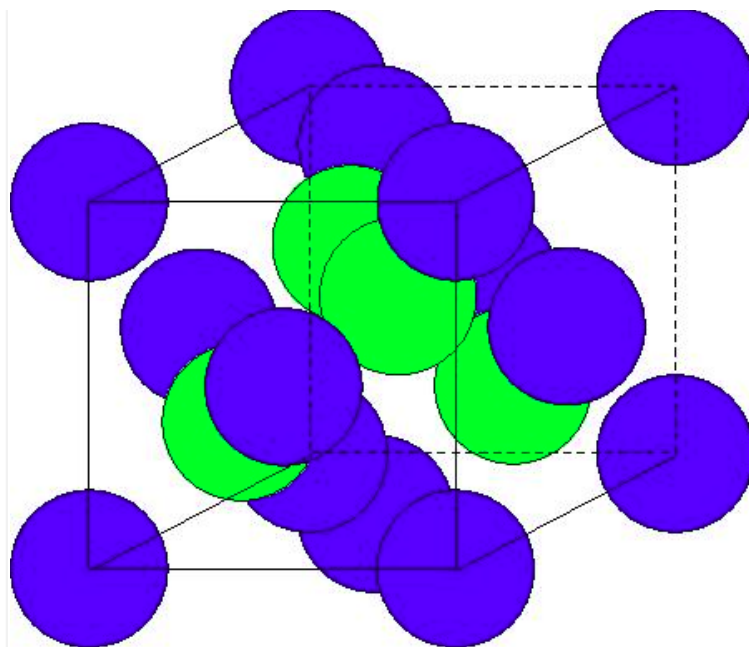
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<p>Assignment 3 Solution</p>	<p>4) For a BCC crystal, the number of mirror planes parallel to any one of the six faces of the cube is equal to <b>1 point</b></p>
<p>Week 4 : Symmetry in Crystals Part 2</p>	<p><input type="radio"/> 1  <input type="radio"/> 2  <input type="radio"/> 3  <input type="radio"/> 4</p>
<p>Week 5 : Crystal Systems, Point Groups and Space Groups</p>	<p><b>No, the answer is incorrect.</b>  <b>Score: 0</b></p>
<p>Week 6 : Crystallographic Notations</p>	<p><b>Accepted Answers:</b>  1</p>
<p>Week 7 : Coordination number, voids, defects in crystals</p>	<p>5) In a diamond cubic lattice, the axis passing along one of the body diagonal is <b>1 point</b></p>
<p>Interactive Session</p>	<p><input type="radio"/> a 3 symmetry axis  <input type="radio"/> a <math>\bar{3}</math> symmetry axis  <input type="radio"/> a <math>\bar{6}</math> symmetry axis  <input type="radio"/> not a symmetry axis</p>
<p>Week 8 : X-ray Diffraction and Concepts related to X-ray Diffraction</p>	<p><b>No, the answer is incorrect.</b>  <b>Score: 0</b></p> <p><b>Accepted Answers:</b>  a 3 symmetry axis</p>
<p>Week 9 : X - Ray Diffraction, X - Ray Crystallography &amp; Electron Microscopy</p>	<p>6) The point symmetry element that is present in bcc but not in fcc is <b>1 point</b></p>
<p>Week 10 : Common Crystal Structures</p>	<p><input type="radio"/> an inversion centre  <input type="radio"/> a four fold rotation axis  <input type="radio"/> a three fold rotation axis  <input type="radio"/> None. All symmetry operations of bcc are in fcc</p>
<p>Week 11 : Theory of Electronic Structure of Solids</p>	<p><b>No, the answer is incorrect.</b>  <b>Score: 0</b></p> <p><b>Accepted Answers:</b>  None. All symmetry operations of bcc are in fcc</p>
<p>Interaction Session</p>	<p>7) Consider a conventional diamond cubic cell with an atom at the corner of the cell. The location of the <math>\bar{4}</math> rotoinversion axis in this cell is <b>1 point</b></p>
<p>Week 12 : Theory of Electronic Structure of Solids, Part 2</p>	<p><input type="radio"/> along the body diagonals  <input type="radio"/> parallel to one of the axes and passing through the centre of the two opposite faces.  <input type="radio"/> from the centre of the one of the 12 edges to the centre of the opposite edge.  <input type="radio"/> None of the above</p>
	<p><b>No, the answer is incorrect.</b>  <b>Score: 0</b></p> <p><b>Accepted Answers:</b>  parallel to one of the axes and passing through the centre of the two opposite faces.</p>
	<p>8) A zinc blende crystal structure can be thought of as a diamond- cubic like structure where the atoms at the body diagonals are different from those at the face centres. In the figure below, you can consider that the blue and the green points represent different atoms. <b>1 point</b></p>



The point symmetry element of a regular diamond cubic crystal (where the blue and the green points are the same atom), which is NOT present in the zinc blende structure are

- 3 axis along the body diagonal
- mirror plane parallel to one of the axes and passing through the square diagonal of the perpendicular face
- centre of inversion located  $1/8$  of the way along the body diagonal
- None. All the symmetries of the diamond are present in the zinc blende structure

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*centre of inversion located  $1/8$  of the way along the body diagonal*

9) Consider the following statements regarding rotoinversion axes:

**1 point**

**S1:**  $\bar{1}$  is always equivalent to an inversion.

**S2:**  $\bar{2}$  is always equivalent to a mirror reflection about a plane perpendicular to the axis of rotation.

Which of the following choices is correct?

- S1** is correct but **S2** is wrong.
- S2** is correct but **S1** is wrong.
- Both **S1** and **S2** are correct
- Both **S1** And **S2** are wrong.

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

***S1** is correct but **S2** is wrong.*

10) The point symmetry element of an FCC lattice which is not present in a NaCl structure is **1 point**

- centre of inversion
- 3 axis along body diagonal
- Mirror plane perpendicular to a face intersecting it along the diagonal
- none of the above 3

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**  
*none of the above 3*

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