CHEMISTRY

BOOKS - PATHFINDER CHEMISTRY (BENGALI ENGLISH)

THE SOLID STATE

Question Bank

1. Why amorphous solids are isotropic?

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2. Give two examples of covalent solids.

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3. What is the number of atoms per unit cell in a metallic crystal having BCC structure.

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4. What is the coordination number of each atom in HCP and CCP structures?

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5. In an alloy of gold and cadmium if gold crystallizes in cubic structure occupying the corners only and cadmium fits into edge centre voids, what is the formula of the alloy?

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6. If silver iodide crystallizes in zinc blende structure with I^- ions forming the lattice, then what fraction of tetrahedral voids is occupied by Ag^+ ions?

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7. A Cubic solid is made of two elements X and Y, atom Y are at the comers of the cube and X at the body centre. What is the formula of the compound?

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8. Name the non stoichiometric paint defect responsible for colour in alkali metal halides.

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9. Name the crystal defect which lowers the density of an ionic crystal.

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10. What happens when a ferromagnetic substance is heated to high temperatures?

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11. Why is Frenkel defect not shown by alkali metal halides?

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12. Crystal has face centred cubic structure, having atomic weight $6.023 ygmol^{-1}$. If the minimum distance between two atoms is $y^{1/3}$ nm and the observed density is $20 kgm^{-3}$ find density in Kgm^{-3}.

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13. Crystal has face centred cubic structure, having atomic weight $6.023 ygmol^{-1}$. If the minimum distance between two atoms is $y^{1/3}$

nm and the observed density is $20kgm^{-3}$ find type of defect in crystal lattice.

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14. The composition of a sample of wustite is $Fe_{0.93}O_1$. What percentage of the iron is present in the form of Fe(III)?

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15. In a crystalline solid , anion B^- are arranged in a cubic close packing. Cations A^+ are equally distributed between octahedral and tetrahedral voids. If all the octahedral voids are occupied, what is the formula of the solids?

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16. Potassium crystallizes in a body centred cubic lattice. Calculate the approximate

number of unit cells in 1g of potassium. Atomic mass of potassium = 39u

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17. Why the window glass of old buildings look milky?

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18. Why is the window glass of the old building thick at the bottom ?

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19. Copper has fcc structure. If its density is $8.92 g cm^{-3}$, calculate its radius if atomic weight of Cu is $63.5 g mol^{-1}$.

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20. Calculate the efficiency in body centred cubic crystal.

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21. Diamond and solid rhombic sulphur both are covalent solids but latter has very low melting point than former. Explain why?

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22. Out of $SiO_2(s), Si(s), NaCl(s)$ and $Br_2(I)$ which is best electrical conductor and why?

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23. Sodium metal has bcc structure with edge length $4.29\overset{0}{A}$, What is length of body diagonal of unit cell?

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24. The metal calcium crystallizes in a face centred cubic unit cell with a = 0.556 nm. Calculate the density of the metal if it contains $0.2\,\%$ Frenkel defect

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25. The metal calcium crystallizes in a face centred cubic unit cell with a = 0.556 nm. Calculate the density of the metal if it contains $0.1\ \%$ Schottky defects

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26. In The mineral, spinel having the formula $MgAl_2O_4$, oxide ions are arranged in the cubic close packing, Mg^{2+} ions occupy the tetrahedral voids while Al^{3+} ions occupy the

octahedral voids.

What percentage of tetrahedral voids is occupied by $Mg(2+)$ ions?

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27. In The mineral, spinel having the formula $MgAl_2O_4$, oxide ions are arranged in the cubic close packing, Mg^{2+} ions occupy the tetrahedral voids while Al^{3+} ions occupy the octahedral voids.

What percentage of octahedral voids Is occupied by Al^{3+} ions?

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28. A Metal crystallizes into two cubic phases, face-centred cubic and body centred cubic whose unit cell lengths are $3.5\overset{0}{A}$ and $3.0\overset{0}{A}$ respectively. Calculate the ratio of the densities of fcc and bcc crystals.

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29. An element X with an atomic mass of $60 gmol^{-1}$ has density of $6.23 gcm^{-3}$. If the edge !length of its cubic unit cell is 400 pm, identify the type of cubic unit cell. Calculate the radius of an atom of this element.

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30. What are ferrites?

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31. What benefit might be gained, if a germanium semiconductor were doped with silver or gold rather than gallium atoms?

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32. Explain the following with suitable examples:

Ferromagnetism

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33. Explain the following with suitable examples:

Antiferromagnetism

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34. Explain the following with suitable examples:

Ferrimagnetism

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35. A unit cell consists of a cube in which there are A atoms at the corners and B atoms at the face centres. Two A atoms are missing from the two comers of the unit cell. What is the formula of the compound?

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36. Calculate the number of atoms in a cubic based unit cell having one atom on each comer and two atoms on each body diagonal.

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37. Distinguish between the following pairs of terms

Hexagonal close packing and cubic close packing

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38. Distinguish between the following pairs of terms

Crystal lattice and unit lattice

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39. Distinguish between the following pairs of terms

Tetrahedral void and octahedral void

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40. Distinguish between the following pairs of terms

Metallic solid and ionic solid

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41. Distinguish between the following pairs of terms

p-type and n-type semiconductor

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