Rules to Answer

Accurate answer supported by evidence, and reasoning links answer and evidence.
Response is specific and detailed.
Presence of keywords and scientific terminology.

Rules to Answer

Refer content if unable to recall after 15-30sec of trying, then again retrieve from memory without help.

Amorphous Solid

Define the term amorphous. Give a few examples of amorphous solids.

Quartz and Glass

What makes a glass different from a solid such as quartz? Under what conditions could quartz be converted into glass?

Crystalline Solids

Name all types of crystalline solids

Crystalline Solids

Elaborate:
Molecular Solids
Ionic Solids
Atomic solids

Crystalline Solids

What are polymorphs?

Types of Atomic solid

Nonbonding atomic solids
Metallic atomic solids
Network covalent atomic solids

Atomic Solid

Which type of atomic solid forms closest-packed structure?

Classify as ionic, metallic, molecular, network covalent or amorphous

P_4O_{10}, $(NH_4)_3PO_4$, SiC, I_2, P_4, Plastic, Graphite, Brass, Rb, LiBr

Coordination Number

What is meant by term coordination number?

Coordination Number

Simple Cubic
Body-Centered Cubic
Face-Centered Cubic

Atoms per Unit Cell

Simple Cubic
Body-Centered Cubic
Face-Centered Cubic

Edge Length

Simple Cubic
Body-Centered Cubic
Face-Centered Cubic

What is Coordination number of following structure?

Cubic close packed structure
Body centered cubic close structure

Atomic mass

Determine the atomic mass of unknown metal if you know its density and the dimension of its unit cell.

Type of intermolecular forces

Solid water
Ethyl Alcohol
Diethyl ether
Methane

Hexagonal close-packing

Elaborate

Cubic close-packing

Elaborate and
Compare it with hexagonal close-packing

Crystal lattice and Unit cell

Contrast and Compare

Tetrahedral void and Octahedral void

Contrast and Compare

How many lattice points?

Face-centred cubic
Face-centered tetragonal
Body-centred

Metallic and Ionic crystals

Similarities and Differences

Ionic solids are hard and brittle

Explain

Calculate Packing Efficiency

Simple Cubic
Body-centred cubic
Face-centred cubic

Silver crystallises in fcc lattice. If edge length of the cell is 4.07 x 10^{-8}cm and density is 10.5 g cm^{-3}, calculate the atomic mass of silver

In a cubic solid, atoms of Q are at the corners of the cube and P at the body-centre. What is the formula of the compound? What are the coordination numbers of P and Q?

Niobium crystallises in body-centred cubic structure. If density is 8.55 g cm^{-3}, calculate atomic radius of niobium using its atomic mass 93 u.

If the radius of the octachedral void is r and radius of the atoms in close packing is R, derive relation between r and R.

Copper crystallises into a fcc lattice with edge length 3.61 x 10^{-8}cm. Show that the calculated density is in agreement with its measured value of 8.92 g cm^{-3}.

Analysis shows that nickel oxide has the formula $Ni_{0.98}O_{1.00}$. What fractions of nickel exist as Ni^{2+} and Ni^{3+} ions?

Semiconductor

What is a semiconductor? Describe the two main types of semiconductors and contrast their conduction mechanism.

Non-stoichiometric cuprous oxide, Cu_2O can be prepared in laboratory. In this oxide, copper to oxygen ratio is slightly less than 2:1. Can you account for the fact that this substance is a p-type semiconductor?