

# CHEMISTRY STUDY MATERIALS FOR CLASS 12 (NCERT BASED QUESTIONS WITH ANSWERS)

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## The Solid State (Intext Questions)

**Question 1.1: Why are solids rigid?**

**Answer:-** The intermolecular forces of attraction that are present in solids are very strong. The constituent particles of solids cannot move from their positions i.e., they have fixed positions. However, they can oscillate about their mean positions. This is the reason solids are rigid.

**Question 1.2: Why do solids have a definite volume?**

**Answer:-** The intermolecular forces of attraction that are present in solids are very strong. The constituent particles of solids have fixed positions i.e., they are rigid. Hence, solids have a definite volume.

**Question 1.3: Classify the following as amorphous or crystalline solids:**

Polyurethane, Naphthalene, benzoic acid, Teflon, Potassium nitrate, Cellophane, Polyvinyl chloride, Fiber glass, Copper.

**Answer:- Amorphous solids--** Polyurethane, Teflon, Cellophane, Polyvinyl chloride, Fibre glass

**Crystalline solids--**Naphthalene, benzoic acid, potassium nitrate, copper

**Question 1.4: Why is glass considered a super cooled liquid?**

**Answer:-** Similar to liquids, glass has a tendency to flow, though very slowly.

Therefore, glass is considered as a super cooled liquid. This is the reason that glass windows and doors are slightly thicker at the bottom than at the top.

**Question 1.5: Refractive index of a solid is observed to have the same value along all directions. Comment on the nature of this solid. Would it show cleavage property?**

**Answer:-** An isotropic solid has the same value of physical properties when measured along different directions. Therefore, the given solid, having the same value of refractive index along all directions, is isotropic in nature. Hence, the solid is an amorphous solid. When an amorphous solid is cut with a sharp edged tool, it cuts into two pieces with irregular surfaces.

**Question 1.6: Classify the following solids in different categories based on the nature of intermolecular forces operating in them: Potassium sulphate, tin, benzene, urea, ammonia, water, zinc sulphide, graphite, rubidium, argon, silicon carbide.**

**Answer:-** Potassium sulphate → Ionic solid Tin → Metallic solid

Benzene → Molecular (non-polar) solid Urea → Polar molecular solid

Ammonia → Polar molecular solid

Water → Hydrogen bonded molecular solid

Zinc sulphide → Ionic solid

Graphite → Covalent or network solid

Rubidium → Metallic solid

Argon → Non-polar molecular solid

Silicon carbide → Covalent or network solid

**Question 1.7: Solid A is a very hard electrical insulator in solid as well as in molten state and melts at extremely high temperature. What type of solid is it?**

**Answer:-** The given properties are the properties of a covalent or network solid.

Therefore, the given solid is a covalent or network solid. Examples of such solids include diamond (C) and quartz (SiO<sub>2</sub>).

**Question 1.8: Ionic solids conduct electricity in molten state but not in solid state. Explain.**

**Answer:-** In ionic compounds, electricity is conducted by ions. In solid state, ions are held together by strong electrostatic forces and are not free to move about within the solid. Hence, ionic solids do not conduct electricity in solid state. However, in molten state or in solution form, the ions are free to move and can conduct electricity.

**Question 1.9: What type of solids are electrical conductors, malleable and ductile?**

**Answer:-** Metallic solids are electrical conductors, malleable, and ductile.

**Question 1.10: Give the significance of a 'lattice point'.**

**Answer:-** The significance of a lattice point is that each lattice point represents one constituent particle of a solid which may be an atom, a molecule (group of atom), or an ion.

**Question 1.11: Name the parameters that characterize a unit cell.**

**Answer:-** The six parameters that characterize a unit cell are as follows.

(i) Its dimensions along the three edges,  $a$ ,  $b$ , and  $c$

These edges may or may not be equal.

(ii) Angles between the edges

These are the angle (between edges  $b$  and  $c$ ),  $\beta$  (between edges  $a$  and  $c$ ), and  $\gamma$  (between edges  $a$  and  $b$ ).

**Question 1.12: Distinguish between**

**(i) Hexagonal and monoclinic unit cells**

**(ii) Face-centred and end-centred unit cells.**

**Answer:- (i) Hexagonal unit cell**

**Monoclinic unit cell**

$$a = b \neq c$$

$$\text{and } \alpha = \beta = 90^\circ$$

$$\gamma = 120^\circ$$

$$a \neq b \neq c$$

$$\text{and } \alpha = \gamma = 90^\circ$$

$$\beta \neq 90^\circ$$

For a hexagonal unit cell,

For a monoclinic cell,

**(ii) Face-centred unit cell:-** In a face-centred unit cell, the constituent particles are present at the corners and one at the centre of each face.

**End-centred unit cell:-** An end-centred unit cell contains particles at the corners and one at the centre of any two opposite faces.

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