

CUMULATIVE TEST SUBJECT: CHEMISTRY

TIME ALLOWED: 1 ½ Hrs. CLASS XII UNIT 1 THE SOLID STATE MM: 25

1. The ratio of close packed atoms to tetrahedral holes in hcp is

- (a) 1 : 1 (b) 1 : 3 (c) 1 : 2 (d) 2 : 1 (1)

2. In which pair, most efficient packing is present

- (a) hcp and bcc (b) hcp and simple cubic
(c) hcp and fcc (d) fcc and bcc (1)

3. Atoms of element Y form hcp arrangement and those of element X occupy $\frac{2}{3}$ rd of tetrahedral voids. The total number of X and Y per formula unit is

- (a) 5 (b) 3 (c) 7 (d) 4 (1)

Question 4 and 5 are assertion reason type questions

In the following questions a statement of assertion followed by a statement of reason given.

Choose correct answer out of the following choices.

- (a) Both assertion and reason are correct statements, and reason is the correct explanation of the assertion.
(b) Both assertion and reason are correct statements, but reason is not the correct explanation of the assertion.
(c) Assertion is correct, but reason is wrong statement.
(d) Assertion is wrong, but reason is correct statement.

4. **Assertion:** Frenkel defect is not found in AgCl.

Reason: Ag⁺ ion has small size and it can easily fit into interstitial sites of Cl⁻ ions. (1)

5. **Assertion:** The packing efficiency of ccp structure is maximum.

Reason: The coordination number is 12 in ccp structure. (1)

6. What is the relationship between the edge length (a) of the unit cell and radius (r) of an atom in (i) bcc and (ii) fcc (1)

7. Frenkel defect is not found in pure alkali metal halides? (1)

8. Analysis of a metal oxide shows its empirical formula M_{0.96}O_{1.0}. Calculate the percentage of M²⁺ and M³⁺ ions in the crystal. (2)

9. KF has ccp structure.

(i) Calculate the radius of the unit cell if the side of the cube of edge length is 400 pm.

(ii) How many F^- ions and octahedral voids are there in the unit cell? (2)

10. An element crystallizes in a body centered cubic structure with edge length of 288 pm. The density of the element is 7.2 g/cm^3 . How many atoms are present in 208 g of the element? (3)

11. Explain:

(i) Some of the very old glass objects appear slightly milky instead of being transparent.

(ii) Zinc oxide exhibits enhanced electrical conductivity on heating.

(iii) CdCl_2 will induce Schottky defect if added to silver chloride crystal. (3)

12. (i) Explain the term F-center.

(ii) If NaCl doped with 10^{-3} mol% of SrCl_2 . What is the concentration of cation vacancies? (3)

13. (a) Why does LiCl acquire pink colour when heated in Li vapours.?

(b) A compound forms hexagonal close packed structure. What is the total number of voids in 0.5 mole of it? How many of these are tetrahedral voids?

(c) If the radius of octahedral void is r and the radius of the atoms in the close packing is R , derive a relationship between r and R . (5)