

BAL BHARATI PUBLI SCHOOL  
GANGA RAM HOSPITAL MARG, NEW DELHI -110060

CLASS –XII  
ASSIGNMENT- 17

SUBJECT – CHEMISTRY  
TOPIC – SOLID

1. Potassium crystallizes in a BCC Lattice. Find number of unit cells in one gram of potassium. ( $K = 39u$ )  
**[Ans.:  $7.72 \times 10^{21}$ ]**
2. The edge length of unit cell of a metal having molecular mass  $75g/mol$  is  $5\text{\AA}$  which crystallizes in cubic lattice. If the density is  $2g/cc$ , find the radius of metal atom. **[Ans.:  $216.5pm$ ]**
3. The metal Calcium crystallizes in a FCC unit cell with  $A = 0.556nm$ . Find the density of the metal if ( $Ca = 40u$ )
  - i. It contains 0.2% Frenkel defects **[Ans.:  $1.5463$ ]**
  - ii. It contains 0.1% Schottky defect. **[Ans.:  $1.5448g/cm^3$ ]**
4. Analysis shows that a metal oxide has an empirical formula  $M_{0.96}O$ . Find the percentage of  $M^{2+}$  and  $M^{3+}$  ion in the sample. **[Ans.:  $91.67\%$ ;  $8.33\%$ ]**
5. Metal crystallizes in 2 cubic phases FCC and BCC whose unit cell lengths are  $3.5\text{\AA}$  and  $3.0\text{\AA}$  respectively. Find the ratio of the densities of FCC and BCC. **[Ans.:  $1.259$ ]**
6. An element 'X' with at mass of  $60g/mol$  has density of  $6.23g/cm^3$ . If the edge length of its cubic unit cell is  $400pm$ . Identify the type of cubic unit cell. Find the radius of an atom of this element. **[Ans.:  $Z=4$ ;  $R=141.4pm$ ]**
7. An element with molar mass  $2.7 \times 10^{-2}kg/mol$  forms a cubic unit cell with edge length  $405pm$ . If the density is  $2.7 \times 10^3kg/m^3$ . What is the nature of this cubic unit cell? **[Ans.:  $4\text{ FCC}$ ]**
8. Silver crystallizes in FCC lattice. If edge length of this cell is  $4.077 \times 10^{-8}cm$  and density is  $10.5gm/cm^3$ . Find the atomic mass of silver. **[Ans.:  $107.12g$ ]**
9. Niobium crystallizes in BCC structure. If the density is  $8.55g/cm^3$ . Find the radius of niobium using its atomic mass  $93u$ . **[Ans.:  $14.29 \times 10^{-7}cm$ ]**
10. Aluminum crystallizes in cubic close-packed structure gets metallic radius is  $125pm$ .
  - i. What is the length of the side of unit cell? **[Ans.:  $354pm$ ]**
  - ii. How many unit cells are there in  $1cm^3$  of Aluminum? **[Ans.:  $2.26 \times 10^{28}$ ]**
11. An element (atomic mass  $60$ ) having FCC unit cell has the density of  $6.23g/cm^3$ . What is the edge length of this cell? **[Ans.:  $400pm$ ]**
12. A BCC unit cell has density  $10.3g/cm^3$  with edge length  $314pm$ . Find atomic mass. **[Ans.:  $96g$ ]**
13. Find the type of cubic lattice to which the iron crystal belongs if its unit cell has an edge length of  $286pm$  and density of iron is  $7.86g/cm^3$ . **[Ans.:  $2\text{ BCC}$ ]**
14. An element (A) crystallizes in FCC structure,  $200g$  of this element has  $4.12 \times 10^{24}$  atoms. The density of A is  $7.2g/cm^3$ . Find the edge length of unit cell. **[Ans.:  $6.46\text{\AA}$ ]**
15. Lithium metal has a BCC structure. Its density is  $0.53 g/cm^3$  and its atomic mass is  $6.94g/mol$ . Find the volume. **[Ans.:  $4.348 \times 10^{-23}cm^3$ ]**
16. Sodium crystallizes in cubic lattices and the edge of the unit cell  $430pm$ . Find the number of atoms in the unit cell. Density is  $0.9623g/cm^3$ . **[Ans.:  $Z=2$ ]**

17. Chromium crystallizes in BCC structure with edge 286pm. Find atomic radius, number of atoms per unit cell and density. **[Ans.: 124.27pm; 27.3g/cm<sup>3</sup>]**
18. The nearest neighbor silver atom in the silver crystal are 287pm apart. What is the density of silver? It forms FCC structure and molecular mass of silver is 107.87g/mol. **[Ans.: 10.72g/cm<sup>3</sup>]**
19. Iron metal has BCC with edge 286.65pm. The density is 7.87 g/cm<sup>3</sup>. Find Avogadro's number. **[Ans.: 6.043×10<sup>23</sup>]**
20. Silver crystallizes in FCC with side length with side length of 409pm. What is the radius of an atom of silver? **[Ans.: 144.6pm]**
21. The density of copper metal is 8.95 g/cm<sup>3</sup>. If the radius of copper is 127.8pm. Is copper is simple cubic, BCC or FCC? (Cu = 63.54u) **[Ans.:]**