

* Example:

(X) Packing: looser

(XI) Example: Si, Zn, etc.

* Zinc Sulphide or Zinc blende structure:

\Rightarrow Zinc sulphide structure is same as diamond cubic structure except if one fcc unit cell of Zn atom then other fcc unit cell is of sulphur atom. Each sulphur atom surrounded by 4 Zn atom or vice versa.

(i) No. of ^{atom} per unit cell: $\Rightarrow 4S, 4Zn$

$\Rightarrow 4$ ZnS molecules

Here the number of basis is 1 ZnS molecule.

(ii) Co-ordinate No. — 4.

(iii) Nearest neighbour distance.

$$r_{Zn} + r_S = \frac{\sqrt{3}}{4} a.$$

(iv) No of 1st nearest neighbour $\Rightarrow 12$.

(v) 1st nearest neighbour = $\frac{a}{\sqrt{2}}$

(vi) Volume of unit cell — a^3

(vii) Volume of primitive cell — $\frac{a^3}{4}$.

(viii) No. density — $4/a^3$.

(ix) A.P.F. \Rightarrow we can't calculate this until we don't know about ratio of Zn & S atoms.

ie $\frac{r_{Zn}}{r_S}$.

$$A.P.F. = \frac{4 \times \frac{4}{3} \pi r_{Zn}^3 + 4 \times \frac{4}{3} \pi r_S^3}{\left(\frac{4 (r_{Zn} + r_S)}{\sqrt{3}} \right)^3}$$

$$A.P.F. = \frac{\frac{16}{3} \pi (r_{Zn}^3 + r_S^3)}{\frac{64}{3\sqrt{3}} (r_{Zn} + r_S)^3}$$

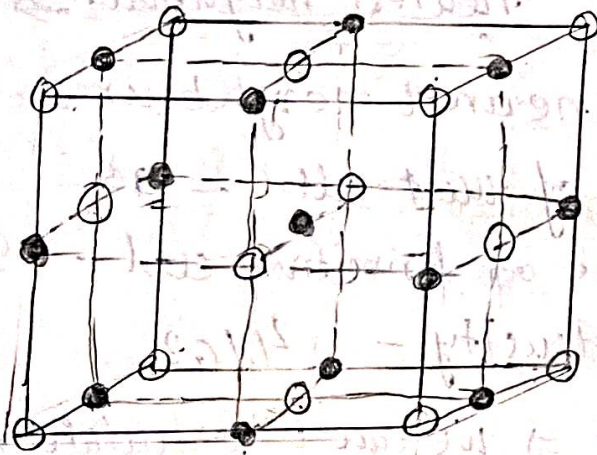
$$A.P.F. = \frac{\sqrt{3} \pi r_S^3 \left[\left(\frac{r_{Zn}}{r_S} \right)^3 + 1 \right]}{4 r_S^3 \left(1 + \frac{r_{Zn}}{r_S} \right)^3}$$

$$A.P.F. = \frac{\sqrt{3} \pi}{4} \frac{\left[\left(\frac{r_{Zn}}{r_S} \right)^3 + 1 \right]}{\left(1 + \frac{r_{Zn}}{r_S} \right)^3}$$

(*) Packing = Loose

(*) Examples ZnS, GaAs, CdS etc and InSb. etc

* NaCl Structure OR (Rock Salt Structure)



NaCl unit cell