Face Centred Cubic Structure

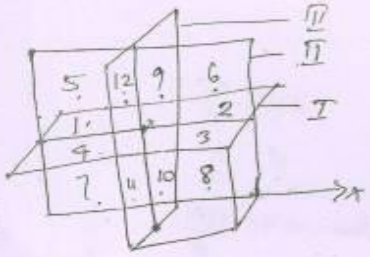
1. No. of atoms per unit cell

No. of atoms in unit cell from the contribution of Corner atom $\frac{1}{8}\times 8 = 1$

" " " " " " Face-centred atom $\frac{1}{2}\times 6 = 3$

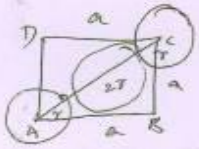
Total no. of atoms in the unit cell $= 1+3 = 4$

2. Coordination number



Face centred atom

$4+4+4 = 12$



3. atomic radius

ΔABC

$AC^2 = AB^2 + BC^2$

$(4r)^2 = a^2 + a^2$

$(4r)^2 = 2a^2$

$16r^2 = 2a^2 \Rightarrow a^2 = \frac{16r^2}{2} \Rightarrow a = \frac{4r}{\sqrt{2}}$

$r^2 = \frac{2a^2}{16}$

$r = \frac{\sqrt{2}a}{4}$

4. P.F

No. of atom per unit cell $= 4$

$V = 4 \times \frac{4}{3}\pi r^3$

$V = a^3$

$\Rightarrow \frac{4\times\frac{4}{3}\pi r^3}{\left(\frac{4r}{\sqrt{2}}\right)^3} \Rightarrow \frac{16\pi r^3}{3} \times \frac{\sqrt{2}\times\sqrt{2}\times\sqrt{2}}{4\times 4\times 4\times r^3}$

$= \frac{\sqrt{2}\pi}{6} \Rightarrow \frac{3.14\times 1.732}{6}$

74%