



SNS COLLEGE OF TECHNOLOGY

(AN AUTONOMOUS INSTITUTION)
SNS Kalvi Nagar, Saravanampatti Post
Coimbatore - 641 035



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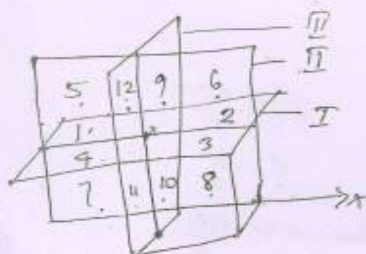
Face Centred Cubic Structure

1. No. of atoms per unit cell

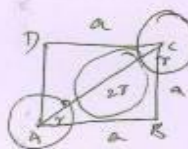
No. of atoms in unit cell from the contribution of Corner atom $\frac{1}{8} \times 8 = 1$
" " " " " " " " Face-centred atom $\frac{1}{2} \times 6 = 3$
Total no. of atoms in the unit cell = $1 + 3 = 4$

2. Coordination number

face centred atom



$$4 + 4 + 4 = 12$$



3. atomic radius

A ABC

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

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

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

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

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

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

4. PE

No. of atom per unit cell = 4

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

$$V = a^3$$

$$\Rightarrow \frac{4 \times \frac{4}{3} \pi r^3}{\left(\frac{4r}{\sqrt{2}}\right)^3} \Rightarrow \frac{16 \pi r^3}{3} \times \frac{\sqrt{2} \times \sqrt{2} \times \sqrt{2}}{4 \times 4 \times 4 r^3} = \frac{\sqrt{2} \pi}{6} \Rightarrow 3 \frac{14 \times 1.732}{6}$$

14.1