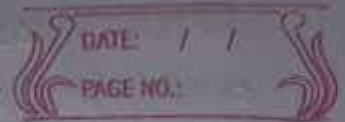


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Physics - 2 (ISB II PH 211)

Assignment - 6

Show that FCC crystals are more closely packed than BCC crystals.

$$\text{FCC: } (PF)_{\text{FCC}} = \frac{4 \times \frac{4}{3} \pi \left(\frac{\sqrt{2}a}{4}\right)^3}{a^3} \times 100 \quad \left(PF = \frac{Z \cdot V_c \times 100}{V_s} \right)$$

$$(Z_{\text{FCC}} = 4) \quad = 74\%$$

$$\left(\begin{aligned} \sqrt{2}a &= 4r \\ r &= \frac{\sqrt{2}a}{4} \end{aligned} \right)$$

$$\text{BCC: } \begin{aligned} \sqrt{3}a &= 4r \\ r &= \frac{\sqrt{3}a}{4} \end{aligned} \quad (PF)_{\text{BCC}} = \frac{2 \times \frac{4}{3} \pi \left(\frac{\sqrt{3}a}{4}\right)^3}{a^3} \times 100$$

$$Z_{\text{BCC}} = 2 \quad = 54\%$$

$$PF]_{\text{FCC}} > PF]_{\text{BCC}}$$

hence, FCC crystals are more closely packed than BCC crystals.