Chemistry Formula Sheet

Chapter by chapter, topic by topic. Written by the PadhoNa team for quick revision.

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CHAPTER 16

Solid State

Unit cells

ATOMS PER CELL

$$\text{SC } 1, \qquad \text{BCC } 2, \qquad \text{FCC } 4; \qquad \text{corner } \tfrac{1}{8},\ \text{face } \tfrac{1}{2},\ \text{edge } \tfrac{1}{4},\ \text{body } 1$$

EDGE AND RADIUS

$$\text{SC } a = 2r; \qquad \text{BCC } \sqrt{3}a = 4r; \qquad \text{FCC } \sqrt{2}a = 4r$$

COORDINATION NUMBER

$$\text{SC } 6, \qquad \text{BCC } 8, \qquad \text{FCC / HCP } 12$$

Packing and density

DENSITY

$$d = \frac{Z\,M}{N_A\,a^3}$$

PACKING EFFICIENCY

$$\text{SC } 52.4\%, \qquad \text{BCC } 68\%, \qquad \text{FCC / HCP } 74\%$$

VOIDS

$$\text{in close packing of } N \text{ spheres: } N \text{ octahedral},\ 2N \text{ tetrahedral}$$

RADIUS RATIO

$$\frac{r^+}{r^-}:\ 0.225\text{–}0.414 \text{ tetrahedral (CN 4)};\ 0.414\text{–}0.732 \text{ octahedral (CN 6)};\ 0.732\text{–}1 \text{ cubic (CN 8)}$$

Defects

Schottky: density falls; Frenkel: density unchanged;

metal excess (F-centres) gives colour

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