Brainbox learn easy

Unit 1

The Solid State

Close packed structures:

Constituent particles are considered as identical hard spheres and three dimensional structures can be built stepwise.

1. **Close packing in one dimension**:

Only possible way is to arrange them in arrow by touching each other.

2. **Close packing in two dimensions**:

Stacking of rows in two dimensions can be done two ways.

(i) **Placing second row exactly above first row.**

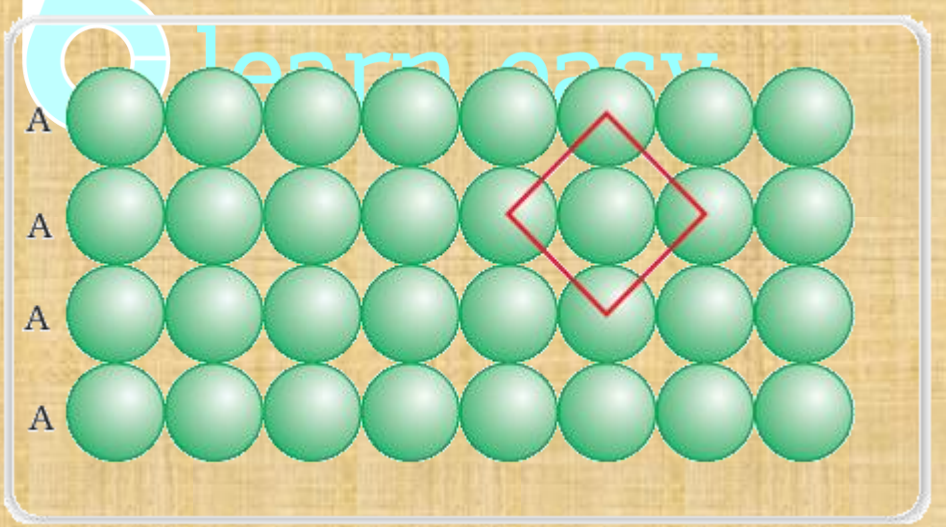

Fig. *Square close packing*

(ii) **Placing second row in depression of first row.**

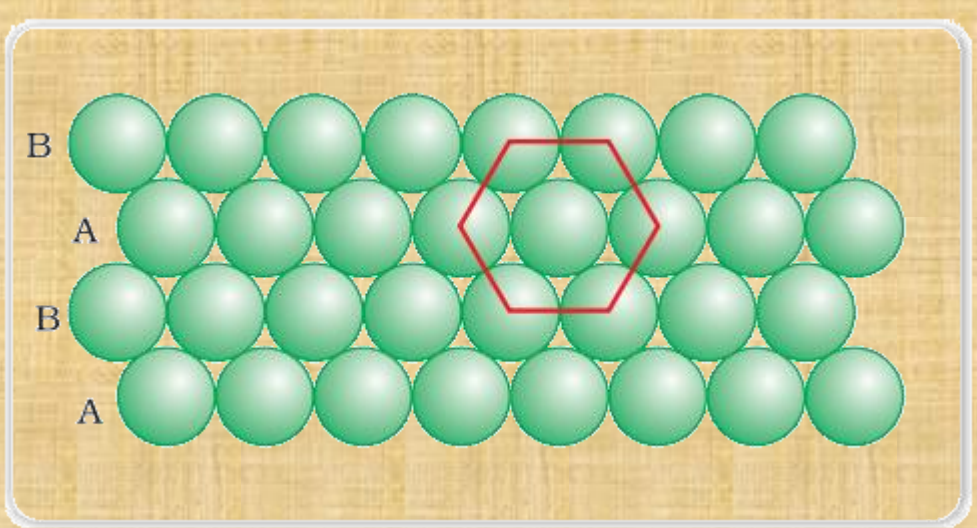

***Fig**. hexagonal close packing of spheres in two dimensions*

This gives ABAB type of arrangement and called as hexagonal close packing in two dimensions.

3. **Close packing in three dimensions.**

(i) Square close packing in two dimensions gives only possible way to arrange, that two place the layers exactly one above another. This gives AAA type arrangement and called Square close packing in three dimensions.

(ii) Hexagonal close packing can be made three dimensional in two ways.

The second layer is placed over the depressions of first layer by covering triangular voids. This gives two types of voids.

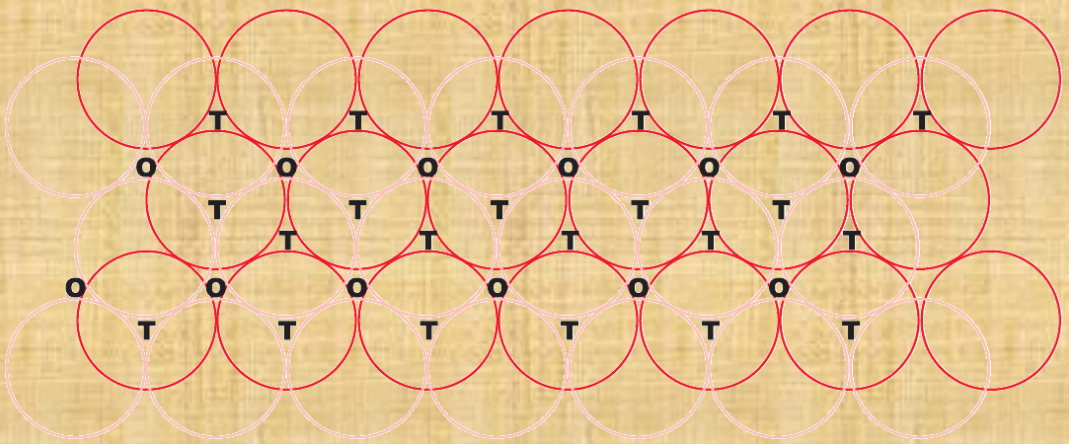

Fig. A stack of two layers of close packed spheres and voids generated in them. T = Tetrahedral void; O = Octahedral void

(i) Tetrahedral void

(ii) Octahedral void

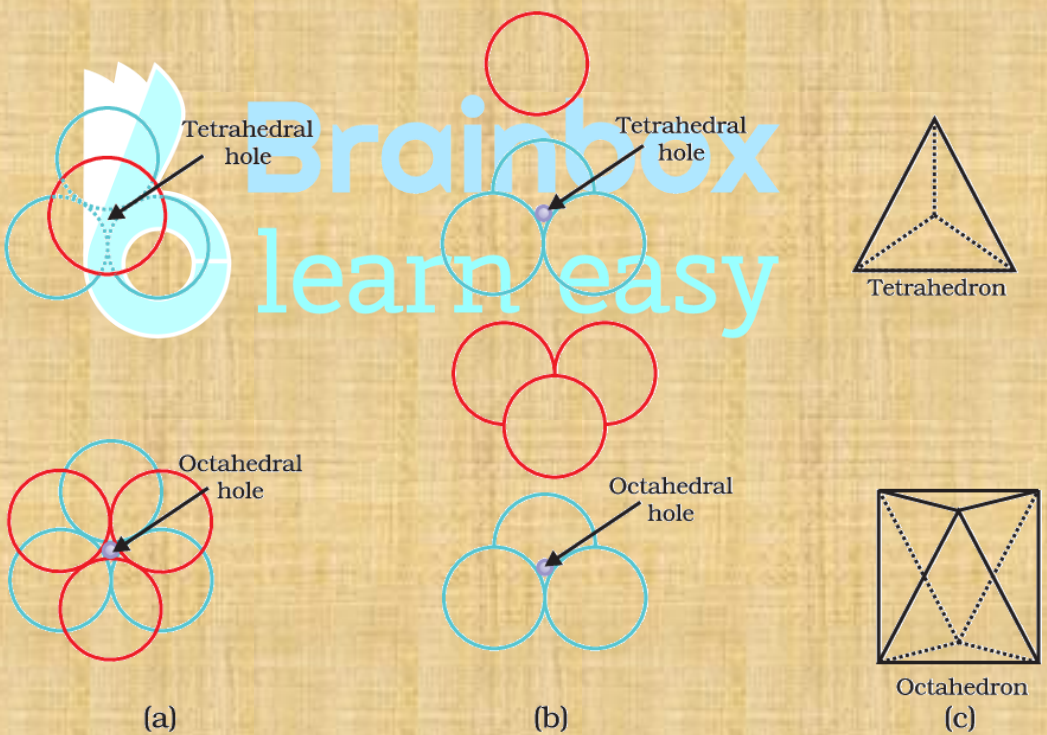

***Fig**. Tetrahedral and octahedral voids (a) top view (b) exploded side view and (c) geometrical shape of the void*