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Class ⇒ B.Sc. Part II Subsidiary
Subject ⇒ Chemistry
Chapter ⇒ Solid state
Topic ⇒ Laws of crystallo-graphy.

Name ⇒ DR. Amarendra Kumar,
Deptt. of Chemistry,
Jain College, Ara.

Laws of crystallography

The branch of science which deals with the study of geometry, properties and structure of crystals and crystalline substances is called crystallography.

Three fundamental laws of crystallography are

(i) The law of Constancy of Interfacial angles
(ii) The law of rationality of indices
(iii) The law of symmetry

(i) The law of Constancy of Interfacial angles.

The angles between the corresponding faces called the interfacial angles of the crystals of a particular substance are always the same.

This is called the law of constancy of interfacial angles.

e.g.

Shapes of the crystals of a particular substance.

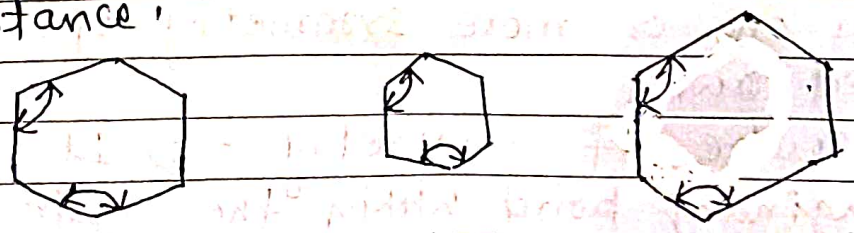

Fig:- Shapes of crystals (crystal habits) of a particular substance.

(ii) The law of rationality of indices

If the intercepts of any a face of the crystal on the three axes are measured, the following generalization is observed which is called law of rational indices.

The intercepts made by any face of the crystal on the crystallographic axes are either,

(i) Same as those of the unit plane

(ii) Simple whole number multiples of those of the unit plane

(iii) one or two intercepts may be infinity, if the face is parallel to one or two axes, i.e. the face does not cut one or two axes.

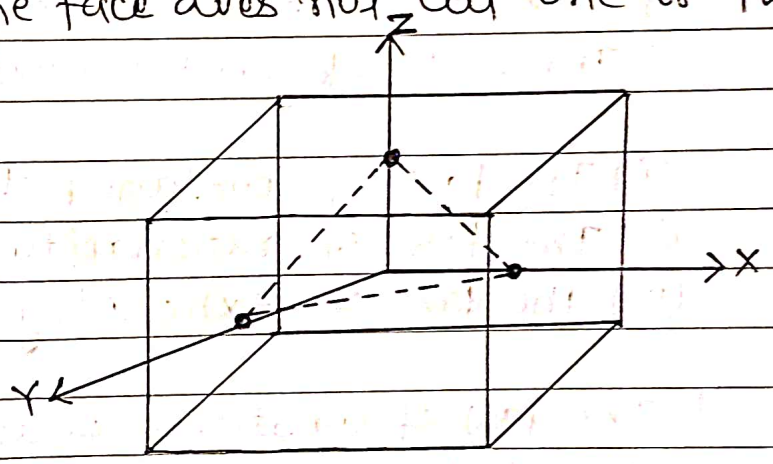

Fig:- Intercepts made by the faces of a cube on the axes.

(iii) The law of symmetry

The symmetry element is a geometrical entity such as a plane, a line or a point with respect to which one or more symmetry operation may be carried out.

(a) Centre of symmetry ⟹ It is defined as an imaginary point within the crystal such ~~as~~ that any line passing through this point intersects the opposite faces of the crystal at equal distances.

(ii) Plane of symmetry ⇒ It is defined as an imaginary plane passing through, the crystal such that it divides the crystal into two parts in such a way that one part is the mirror image of the other.

This plane is called mirror plane i.e. the plane may be regarded as mirror through which the two halves of the objects are reflected.

(iii) Axis of symmetry ⇒ The axis of symmetry is defined as the imaginary line passing through the crystal such that when the crystal is rotated about this line, exactly similar appearance occurs more than once in one complete revolution i.e. in a rotation through 360°.