42. Analogy between crystallographic and atomic laws.

An analogy has been pointed out[1] between the atomic theory in chemistry, by which Dalton explained the fixed simple and multiple proportions of the combining weights of various substances, and the molecular theory of crystalline structures, by which the fundamental forms of crystals are defined and the accessory forms derived from them. It has been found that if once a crystal has been defined by a fundamental plane referred to three axes at fixed angles, all other planes or faces can be defined by simple multiples of the numbers which belong to the fundamental plane, and which are called the parameters of the crystal. This fundamental rule or law of crystallisation, termed by Haüy the law of derivation, stands thus in the same relation to the corpuscular theory of the structure of bodies as the law of fixed multiple proportions stands to the original atomic view of matter, and it is thought that it may in the future lead to important results.[2]

43. Isomorphism.

Another very remarkable discovery had been made by Mitscherlich in 1823.[3] This is the property which various compounds possess of crystallising in the same forms, although they contain different elements—such elements being, however, joined together by similar formulæ. The elements are, as it were, interchangeable. This phe-

[1] See Ostwald, "Allgemeine Chemie,' vol. i. p. 870.

[2] A question arises in this connection as to the accuracy of the crystallographic law of the fixity of the angles. In respect of this Ostwald says: "On examining the validity of the fundamental laws of crystallography, it becomes evident that they are only approximate, or perhaps more correctly, that there exist numerous circumstances which permit them to show themselves only in a somewhat disturbed manner" (*loc. cit.*, vol. i. p. 890). This I understand to mean that, if disturbing circumstances could be removed, the law of the fixity of angles and the simple multiples of the indices would obtain with the same accuracy as do the combining numbers and their multiples in chemical combinations.

[3] See *supra*, chap. ii. p. 191 and note.