

Platinum Conditions.—The enormous advance in the price of this metal in late years has proved very embarrassing to chemists and to several industries. This advance has unfortunately contributed to additional difficulty because it has diverted the metal to a use for which it is really not adapted, namely, jewelry. There is no reason to doubt that the practice of setting precious stones in platinum has been adopted because of the high cost of the material, for it has a poor lustre and does not set off the stone as well as gold. George F. Kunz has recently reviewed the conditions of the platinum supply and uses, and some of the data that he sets forth are here noted, being taken from recent issues of the *Chemical News*. The industry is gradually emerging from the chaotic condition into which it was plunged by the war, and even the Russian sources are beginning to be active. A notable increase of production is also recorded in Colombia, the locality, by the way, in which the metal was first detected. The Colombia mines were actively exploited while the Russian mines were blocked, but American companies are now endeavoring to stabilize the South American sources. The price of the metal has fallen somewhat, though still very high. An increased demand for jewelry and dental work has arisen since the close of the war which tends to keep up the price. In 1920 the consumption of platinum in the United States was 141,041 troy ounces, of which 57 per cent. was taken by jewelers, 19 per cent. by electrical industries, 11 per cent. by dental industries, 10 per cent. by chemical operations, the remainder being distributed in minor lines.

Naturally active search has been made for new platinum deposits, but so far no great rewards have come. Kunz states that the outlook for some Alaska exploitations is rather encouraging. In Colombia, the principal deposits are in the Atrato and San Juan Rivers, but a third river is regarded as likely to yield a supply. The United States is about to pay Colombia a large sum as indemnity, and it is hoped that much of this will be used to develop some of the Colombia industries, especially the platinum deposits. Undoubtedly a marked fall in the cost of platinum will be a great advantage to chemists.

H. L.

Application of the Electron Theory of Chemistry to Solids. SIR J. J. THOMSON. (*Phil. Mag.*, April, 1922.)—"Each kind of atom has associated with it a definite number of electrons which form its outer layer when it is in the free state: it is by the rearrangement of these electrons that it is able to hold other atoms, whether of the same or different kinds, in chemical combination. When these atoms aggregate and form a solid there will be in each unit volume of the solid a definite number of these electrons, and the problem is to distribute the electrons so that they will form with the atoms a system in stable equilibrium. . . . We shall begin with the simplest case when the atoms are all of the same kind, *i.e.*, when the solid contains only one chemical element. We suppose that the electrons

are arranged as a series of cells which fill space and that each cell surrounds an atom; the number of cells is equal to the number of atoms. If the atom is monovalent the number of electrons is equal to the number of atoms, if divalent to twice that number, if trivalent to thrice that number and so on. This condition will determine the shape of the cell. If the cells have to be similar and equal and to fill up space without leaving gaps, they must be of a limited number of types. These are as follows: (1) Parallelepiped, if the atoms are of the same kind these may be expected to be cubes; (2) hexagonal prisms; (3) rhombic dodecahedra; (4) cubo-octahedra."

Let one illustration suffice for the type of reasoning employed. Suppose space to be filled with cells of cubical form packed one against the other, and at each of the eight corners of each cube let there be an electron, and, in addition, let there be an electron at the middle of each of the twelve edges of the cube. First, we consider the corner electrons alone. At each corner eight cubes meet and one electron is there, one-eighth of an electron to the account of each cube. The same holds for each of the eight corners of each cube. To the cube's account we therefore reckon eight times one-eighth or one entire electron. Now for the edge electrons. Only four cubes come together at this edge, so the electron at the middle of this common edge is divided equally between the four cubes. The cube has twelve edges, so to its account from the edges there are twelve times one-fourth or three electrons. One electron from the corners and three from the middles of the edges make a total of four for each cube, a possible arrangement for a tetravalent element, which turns out to be less stable than another arrangement. "For most of the valencies more than one arrangement of the electrons is possible, indicating that for such elements there might be allotropic modifications with different crystalline forms." The author next examines on dynamic grounds the stability of certain of the possible configurations of the electrons. This leads to a calculation of the maximum frequency of the vibrations of the electrons and some very satisfactory agreements between the outcome of theory and the data of experiment are noted. Similar agreements are further found in the cases of the bulk modulus and of the dielectric constant.

This paper marks a notable advance toward the complete understanding of crystals.

G. F. S.

Decomposition of Ammonium Nitrate.—Interest in this subject has been developed of late owing to the great explosion at Oppau, the cause of which has not been determined, or if determined by the German experts, has not been definitely published. Suggestions have been made that it was in part due to ammonium compounds. The formula of ammonium nitrate indicates that it may be an explosive if the proper initiative is applied. At a moderate temperature it decomposes almost wholly into water and nitrous oxide, a procedure that has been used for many years on a very large scale for the manu-