to the other during the formation of the ions is reversed to some extent. This deformation (polarization) of the anion indicated in Fig. 7b and c thus leads to a diminution in the polarity of the compound. The degree of this deformation varies greatly in different cases and is, *e.g.*, in Fig. 7, greater in c than in b. It is therefore possible to conceive of an extended series of transition cases between the two limiting types of chemical linkage: one in which the ions are to be considered as rigid spheres which undergo practically no change when combining to form molecules (Fig. 7a), the other in which the electrons of the anions are so strongly drawn toward the cation as to become symmetrically disposed about the two nuclei (Fig. 7d). This latter case would be realized if a negatively charged hydrogen ion, H^-, composed of one proton and two electrons were to combine with a positive hydrogen ion, H^+, consisting of a single proton. This would yield the perfectly symmetrical hydrogen molecule, H_2, in which the two electrons are shared quite equally by both nuclei.

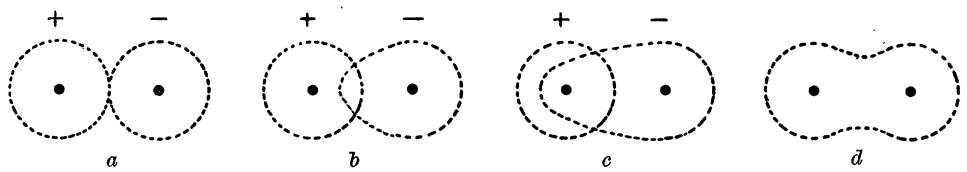

FIG. 7

In general, as was pointed out by the speaker and confirmed by Grimm, extensive experimental material shows that the degree of deformation of the anions increases and the character of the linkage in a molecule or a lattice departs further from the ideal ionic linkage and approaches more closely the non-polar type, the smaller the cation, the higher its charge and the greater the deformability of the anion. Other things remaining the same, in those compounds whose cations lack the character of rare gases the degree of deformation of the anion is greater and the compounds approach more closely the non-polar limit than in the case of those having cations of the rare-gas type. Mercuric iodide stands much farther from the ideal ionic linkage than does sodium chloride, because I^- is much more easily deformable than Cl^-, as refractometric data show, and because Hg^{++} has twice the charge of Na^+. The most important factor in this case is that Na^+ has the structure of neon (eight electrons in the outermost shell, Fig. 1) but Hg^{++} has no rare-gas structure (eighteen outermost electrons). To the intense deformation of the iodine ion by the mercuric ion is due the transition type of mercuric iodide.

Though the classification loses much in simplicity through the presence of these transition types, by taking account of them we attain a single system satisfactory for widely different substances which the dualistic and unitary theories attempted in vain.

I realize that the subject which I have discussed is a difficult one to present to a general audience, and I can only hope that I may have succeeded in giving you some idea of how scientists have attacked this problem of the nature of chemical forces, and of the conclusions which they have reached.

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SCIENTIFIC EVENTS

HISTORIC APPARATUS[1]

THE Institute of Physics a short time ago appointed a committee to inquire into the possibility of drawing up a catalogue of apparatus which had been used in the course of investigations leading to important discoveries. At the request of the committee the institute is now making a general appeal to all who have charge of historic apparatus. The appeal, which is signed by Dr. W. H. Eccles, Sir F. W. Dyson, Sir W. H. Bragg, Sir C. A. Parsons, Sir J. J. Thomson, Sir R. T. Glazebrook and Sir H. G. Lyons, is made with the object of obtaining information as to the existence of apparatus and the researches it was used in, so that students of the history of science may be able to visit, identify and study it. It is also suggested that the committee could possibly assist the owners, if they so desire, to place the apparatus where it could be per-

[1] From *Nature*.

manently secured to the nation. In such institutions as the Science Museum, the Conservatoire des Arts et Métiers, the Deutsches Museum and the Smithsonian Institution, England, France, Germany and America already possess extensive collections of great value, and there are probably few observatories, laboratories or scientific societies which do not own some historic apparatus, while other instruments are in private hands. Practically every private collection, however, is ultimately dispersed, and the compilation of such a catalogue as that now being formed might lead to the more historic apparatus becoming the nation's property. As with pictures and other works of art, the selective principle should be applied, and a joint committee of the Institute of Physics and kindred societies would be a suitable body to act in an advisory capacity.

In the past, wars, riots and fires have been the cause of the destruction of much valuable apparatus. Gilbert's collection, which he bequeathed to the Royal College of Physicians, was lost in the Great Fire of London; Hevelius lost both observatory and instruments by a fire at Danzig in 1679; the great fire at Copenhagen in 1728 led to the destruction of Römer's telescopes, and the first observatory at St. Petersburg was burnt down in 1747. One of the most deplorable of all losses was occasioned by the fire at the Volta Centenary Exhibition at Como in 1900, when Volta's original piles and cells, etc., were lost. Wars have been no less destructive than fires. The manuscripts of Thomas Harriott, astronomer and mathematician, disappeared during the Civil War; Gregory Saint-Vincent, the seventeenth century geometer, lost all in the siege of Prague; Chladni lost some of his acoustical apparatus during the Napoleonic Wars, while Regnault, after the occupation of Paris by the Germans, returned to his laboratory at Sèvres to find his standard apparatus and the results of his great researches on the expansion of gases ruined. The destruction of Priestley's library and apparatus occurred during the Birmingham Riots of 1791. How important instruments may disappear unrecorded is shown by the case of Sturgeon's electrical apparatus. In 1825 the Royal Society of Arts recorded the award of a medal and thirty guineas to Sturgeon for the gift of his electromagnetic apparatus, but this, including the first electromagnet ever made, has unfortunately long since disappeared. Such, it may be hoped, will not happen to any important collection in the future, and we feel that the Institute of Physics is doing a public service in obtaining records which should go far to prevent such losses from happening.

BRITISH AIR ROUTE TO THE ARCTIC REGIONS

WITH the object of establishing an Arctic air route from Great Britain to Canada an expedition of British scientific men will, according to a wireless despatch to the New York *Times*, make the journey in Sir Ernest Shackleton's historic ship "Quest." A group including surveyors, airmen and meteorologists sailed on July 3 for the Faroe Islands, Iceland and Greenland, where they will stay an entire year exploring a route to the North American continent. The Canadian government has shown great interest in the proposal and will soon undertake a survey of the Canadian end of the proposed route from Winnipeg up through Hudson Bay and Baffinland.

The expedition, which is being sent under the auspices of the Royal Geographical Society, will be equipped for a thorough meteorological and geographical survey of Greenland. Airplanes, fast motorboats and dog-teams for scouting trips will all be at the disposal of the expedition on the shores of Iceland and Greenland and on the vast ice-cap of the interior.

As the route has been surveyed an experimental flight will be made over the entire route from England to Canada and back. Not only is it the shortest route, but it has the advantage that the longest stretch of sea flying necessary is only 300 miles. For more than four fifths of the way there are natural emergency landing grounds and a system of gasoline dumps will be carefully organized.

The whole center of Greenland is a vast ice plateau about 500 miles across on a line between Iceland and Baffinland, and rising to 8,000 feet above sea-level. This plateau has been crossed only twice anywhere near its center, and all crossings have been made in summer.

The expedition will establish a base camp on the southeastern coast of Greenland and a station on top of the ice-cap. Meteorologists will stay on the ice-cap a whole year.

From this central base dog-sled expeditions will set out on journeys into the far north of Greenland and down to the south coast. The coastal base camp will be near the Eskimo settlement of Angmagsalik, about forty miles inshore. The central base will be about 150 miles inland on the highest part of the great frozen plateau.

The Prince of Wales has consented to be honorary president of the committee in charge. The leader of the expedition will be H. George Watkins, who led two previous Arctic expeditions. His companions will be Augustine Courtauld, explorer and surveyor; James M. Scott, surveyor and dog-driver; Flight Lieutenant N. Hughes d'Aets, pilot and meteorologist; Captain Percy Lemon, wireless operator; Lawrence R. Wager, geologist; Andrew Stephenson, chief surveyor; John Rymill, surveyor; Fred S. Chapman, ornithologist and ski expert; Quintin Riley, meteor-