visit the Blue Hill Meteorological Observatory, where Professor McAdie was most attentive and explained in detail the investigations he is carrying on there.

The opportunity for interested parties to enroll themselves as charter members remains open until December 31, 1917, and all such persons are invited to join the association, to whom copies of the constitution will be sent upon application to the secretary, Wm. Tyler Olcott, 62 Church Street, Norwich, Conn.

L. C.

BOSTON MEETING OF THE AMERICAN CHEMICAL SOCIETY. IV

DIVISION OF PHYSICAL AND INORGANIC CHEMISTRY

H. P. Talbot, *Chairman*

E. B. Millard, *Secretary*

Joint Meeting with Division of Organic Chemistry, Wednesday Morning

1. *Two new laboratory instruments:* Arthur John Hopkins.

(*a*) A buret-micrometer.

A reading device which permits of correct readings to .001 c.c.

(*b*) A balance for first-year students.

A three-arm balance with non-removable riders in a glass and aluminum case. A distinctive arrest. The bearings are of stellite and the arms of invar tape. The ratio of the arms is such that the weight used is to the load as 4: 1.

2. *Water-lag in a buret:* Arthur John Hopkins.

A study of the amount of pure water clinging to the sides of a buret, under different speeds of discharge. The rule is deduced that, in order that comparable readings may be obtained, the discharge should not be faster than 12 to 15 seconds per cubic centimeter.

Limits of individuality in chemistry: N. T. Bacon. The chances for variation become less and less as complexity of structure is reduced, but now that we recognize atoms as being composed of many parts is it not proper to recognize that at least the individual molecule, if not the atom itself, may have an individuality? Probably each atom would have a normal arrangement of the multiplicity of parts going to build up the atom, but the question is raised whether it is not probable that owing to imperfect elasticity these frequently stand out of the normal position with reference to each other and reducing their tendency to combine so that frequently many times as many collisions are necessary before completion of combination as would be called for by theory.

A new hydrate of lime: H. W. Charlton. This hydrate of lime possesses marked plasticity, and differs from the ordinary $CaO\cdot H_2O$ in containing a considerably less amount of water. Its method of formation precludes the possibility of its being a mixture of CaO and $CaO\cdot H_2O$. One example of its formation comprises digesting $CaO\cdot H_2O$ with ten times its weight of water at 225 pounds pressure for a couple of hours. The resulting plastic material contains but slightly more than 15 per cent. water of combination while it originally contained over 24 per cent. and its specific gravity is but 1.95, while that of $CaO\cdot H_2O$ is about 2.078. This is remarkable as it would naturally be supposed that the specific gravity would lie some place between that of $CaO\cdot$–3.25 and that of $CaO\cdot$–2.078.

An investigation of the reaction between antimony and the solutions of sodium in liquid ammonia: Edward B. Peck. Solutions of sodium in liquid ammonia of concentrations from 0.0049 to 1.2482 gm. atoms of sodium per liter of liquid ammonia were sealed in glass bombs with an excess of antimony and allowed to react at room temperature for from two months to a year. A dark-brown, slightly soluble compound first formed, after which a dark-red solution appeared and the precipitate dissolved. The ratio of antimony to sodium in the solution does not correspond to a small integral number and changed with the concentration of sodium. The ratio Sb/Na changed very rapidly in dilute solutions from a value of $Sb/Na = 1.98$ to a maximum of $Sb/Na = 2.333$ at a sodium concentration of about 0.4N, after which there was a slight decrease to a value of $Sb/Na = 2.254$ at a concentration of 1.248. Two plots of the results were shown, one the ratio Sb/Na against the concentration of sodium, and another the log. of the sodium concentration against the ratio Sb/Na. In both these plots the results lay on a smooth curve. The apparatus for carrying out this work was described in detail. Weighed amounts of sodium were put up in small glass capsules. These capsules were placed across a tube provided with an electromagnetic hammer in the inside, which could be actuated by a solenoid outside. The reaction tube containing metallic antimony was sealed on to this tube. The tube was also connected to a supply of pure ammonia and to a vacuum pump. After evacuating the apparatus, ammonia was condensed in the reaction tube by surrounding it with a bath of liquid ammonia. The sodium was then introduced into the solution by breaking the capsule in two with the electro-magnetic hammer. As soon as the reaction was well started, the bomb was sealed off and allowed to react at room temperature. The bomb consisted of two compartments. When the reaction was completed, the solution was poured off from the excess antimony, and the antimony washed by distilling the solvent over from the solution. The analysis was completed by distilling off the solvent into weighed water bottles and weighing the antimony left behind. Electrolyses of these solutions were carried out at the temperature of boiling ammonia. The electrolyses showed that the compounds in solution are electrolytic in nature and that more than one atom of antimony is associated with each negative carrier. Both the analyses and electrolyses showed that there are at least two compounds involved in the final equilibria, one having more than two atoms and one having less than two atoms of antimony for each negative charge. These compounds are in some ways similar to the polyiodides. A detailed exposition of this investigation will be offered for publication to the *Journal of the American Chemical Society.*

The effect of acid concentration on the photochemical oxidation of quinine by chromic acid: G. S. Forbes and R. S. Dean. In a previous investigation of this reaction by Luther and Forbes, the acid concentration had been constant. In the dark, with concentrations of CrO_3 and purified quinine constant, the velocity varies as the square of the acid concentration. A shallow cylindrical dish was bisected by a glass partition, and revolved under a quartz mercury lamp. Provisions were made for stirring, cooling and temperature measurement. Solutions as described above were compared in pairs. After correction had been made for the dark reaction, the velocity of the photochemical reaction was found independent of acid concentration. It was also proved that quinine solution exposed to light does not retain its activation for long in the dark.

The temperature coefficient of the distribution ratio: G. S. Forbes and A. S. Coolidge. Solubilities in two and three component systems involving water, ether and succinic acid were determined or redetermined at 15°, 20° and 25°, also the distribution ratio of the succinic acid between two ether-water phases. An equation was derived and verified showing the temperature coefficient of the distribution ratio, with excess of the acid, as a function of the temperature and mutual solubility coefficients of each substance in each layer. The distribution ratio, when calculated on the basis of ether-water phases in which the ratios ether to water are constant, is by no means independent of the concentration of succinic acid. Evidence was secured that the average degree of association of water dissolved in ether at these temperatures is somewhat less than two.

The application of palladium as an indicator for silver titrations: L. Schneider. A very dilute solution of palladous nitrate, dissolved in an excess of nitric acid, is added to the silver nitrate solution which is then titrated with potassium iodide. The silver nitrate is precipitated by the potassium iodide and the least excess of potassium iodide is converted by the palladous nitrate to palladous iodide which is visible to the extent of one part in a million. For very dilute solutions, this method gives better precision than the Volhard method. The size of the plus and minus errors have been determined. The constant plus error in concentrated solutions is due to the palladous iodide being carried down by the silver iodide at the end-point, whereas the negative error is caused by the absorption of silver nitrate by silver iodide. The standard method for overcoming these errors has been applied with such effect that not only good precision but satisfactory accuracy has been obtained. The ease and rapidity with which the standard solution and the indicator can be prepared recommend this new method. Also the palladous nitrate method can be used to better advantage than Volhard's in cases where the silver nitrate solutions are colored pink or yellow. Nitrous acid interferes and must be boiled off before titrating.

The application of the thermodynamic methods of Gibbs to equilibria in the ternary system H_2O-K_2SiO_3-SiO_2*:* George W. Morey and Erskine D. Williamson. A discussion of Gibbs's derivation of the phase rule and the application of Gibbs's thermodynamic methods to various types of heterogeneous equilibria occurring in the ternary system H_2O-K_2SiO_3-SiO_2. The slopes of the various P-T curves which proceed from a quintuple point are discussed, with special reference to the dependence of the slope of a given curve on the composition of the phases which coexist along it. The change in slope with change in composition of phases of variable composition is discussed in detail. Conclusions reached in the above discussions are applied to typical cases in the ternary system H_2O-K_2SiO_3-SiO_2.

(*To be continued*)