solutions standardized according to the method just described. Correct and constant results can only be obtained if such a method of standardization is used.

Another error which permeates the literature of colloid chemistry is due to Hofmeister's experiments on the influence of different ions on the swelling of gelatin. Hofmeister's experiments were all made in the presence of an excess of electrolyte, in which the specific effect of different ions can no longer be recognized. When we prepare sodium and calcium gelatinates or gelatin chloride and gelatin sulfate according to the writer's method and put them into distilled water, we find that the sodium gelatinate swells considerably more than the calcium gelatinate and that the gelatin chloride swells considerably more than the gelatin sulfate of the same concentration of isoelectric gelatin and of hydrogen ions. If, however, we add neutral salt or alkali to the two solutions of metal gelatinates or neutral salts or acid to the solutions of gelatin chloride and gelatin sulfate the differences in swelling disappear since in all cases the swelling is repressed. It is only necessary to add enough electrolyte so as to make the solution M/4 or even less to completely mask the differences. The writer feels therefore justified in stating that if we wish to compare the effect of different ions on the physical properties of gelatin we must avoid the error of adding an excess of electrolyte to the solution.

A writer[6] in *Nature* has raised the objection that Sörensen's experiments on the osmotic pressure of egg albumin were done in the presence of ammonium sulfate, but he overlooks the fact that Sörensen's experiments[7] were not concerned with the comparison of the effect of different ions on the osmotic properties of egg albumin. If it had been Sörensen's intention to compare the osmotic pressure of albumin chloride with that of albumin sulfate or of sodium albuminate with that of calcium albuminate he would have found it necessary to take cognizance of the fact that the specific effects of different ions on the physical properties of gelatin (or possibly of proteins in general) are repressed in the presence of an excess of electrolyte. As far as the writer is aware there is no disagreement between his results and views and those of Sörensen, though there is a difference in the method employed and the nature of the protein used.

The writer's recent experiments, seem to indicate that the specific influence of the nature of ions as well as the depressing effect of an excess of electrolyte on the physical properties of colloids are connected with the electrification of water, and that this connection seems to be the same in the case of crystalloidal and of colloidal solutions of electrolytes. Since it would exceed the limits of this note to discuss these observations, the reader interested in this feature of the problem is referred to the writer's publications on the subject in the current numbers of the *Journal of General Physiology* and the *Proceedings of the National Academy of Sciences*.[8]

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NEW YORK

THE AMERICAN CHEMICAL SOCIETY. II

DIVISION OF PHARMACEUTICAL CHEMISTRY

F. O. Taylor, *Chairman*
George D. Beal, *Secretary*

A new field of phytochemical research opened up by the cultivation of medicinal plants on a semi-economical scale: EDW. KREMERS.

Some of the characteristic toxic principles of western poisonous plants: O. A. BEATH.

A comparison of several methods for estimating quinine and strychnine when occurring in the same solution: A. R. BLISS, JR.

Quantitative determination of mercury: SIGMUND WALDBOTT. Precipitate the mercury from dilute solution completely on copper foil, dry and weigh the latter, then expel the mercury by holding the foil *above* a flame until the gray film has

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[6] *Nature*, 1919, CIV. (September 4), 15.

[7] Sörensen, S. P. L., *Compt. rend. trav. Lab. Carlsberg*, 1917, XII.

[8] Loeb, J., *J. Gen. Physiol.*, 1918–19, I., 717; 1919–20, II., 87.

just disappeared, then weigh the foil again. The difference in weight is due to the volatilized mercury. In one instance, 99.83 per cent. of Hg was recovered from HNO_3 solution.

The U. S. P. assay of Donovan's solution: Sigmund Waldbott. The U. S. P. assay of a certain well-prepared Donovan solution gave far too low results in mercuric iodide contents. Preliminary experiments indicated that the two-fold step in the U. S. P. determination of mercury involved some loss. A simple method for the determination of mercury in Donovan's solution is proposed, as follows: Precipitate 25 c.c. of Donovan's solution with excess of freshly prepared ammonium sulphide solution, decant and filter through a double filter, wash, dry at 100° C. and weigh, the two filter papers being previously counterpoised. Two determinations gave satisfactory results.

The theory of emulsion making: W. D. Bancroft.

DIVISION OF WATER SEWAGE AND SANITATION

Robert Spurr Weston, *Chairman*

W. W. Skinner, *Secretary*

Determination of iodid and bromid in mineral waters and brines: W. F. Baughman and W. W. Skinner.

The determination of bromid and iodid in mineral waters and brines: H. H. Willard and C. C. Meloche. The iodid is oxidized to iodate by adding to the neutral solution of salts a considerable excess of permanganate and boiling for a moment. The solution is cooled, a small amount of hydrochloric acid is added, more than enough to liberate all the bromin and a current of air passed through the hot solution to remove all bromin which is collected in sodium hydroxide, reduced to bromid, precipitated as mixed silver chlorid and bromid, fused, weighed, fused in chlorin and weighed again. From the loss in weight the amount of bromin is calculated. The residue in the retort is treated with alcohol to reduce the excess of permanganate, and the manganese dioxide filtered off. To the filtrate potassium iodid is added then excess of acid, and the iodine liberated is titrated with thiosulfate.

The removal of colloidal silicic acid and clay from natural waters: Otto M. Smith.

A study of well water in a rural community: G. O. Higley. This study was begun because of the fact that the death rate from typhoid in Delaware County was 25.2 per 100,000 of population, as against 6.9 for Cuyahoga County (Cleveland) and 3.9 for Hamilton County (Cincinnati). The writer with assistants personally visited about 675 homes, noted the condition of the well and surroundings, talked with the people, emphasizing especially the danger if human excreta finds entrance into well water, and took a sample of water in a sterilized bottle for analysis. The tests made were the lactose broth and the chlorid tests. About 40 per cent. of the water from dug wells was found polluted. As the eastern half of the county is underlain with shale, and the western half with limestone it was thought that the degree of pollution of well water might be found markedly different in the two sections; however the work is still too incomplete to warrant any report on this point.

Field methods for the chlorination of small amounts of water: F. R. Georgia. This paper describes conditions of water supply prevailing in the area occupied by the First Depot Division in France. Various methods and devices are described and illustrated for the continuous chlorination of small supplies of water. Some of these devices were constructed in the field from materials at hand. The Lyster bag for water sterilization is described and methods for its use and control are discussed. Tabulations of the bacteriological results obtained are given.

The electrostatic precipitation of dust as applied to the sanitary analysis of air: J. Penteado Bill. An apparatus was devised for producing a rectified alternating current of about 20,000 volts. The collector is a 12-inch piece of aluminum tubing, 2½ inches in diameter, through which air is drawn by a motor at the rate of 273 cubic feet per hour. Seventy-one tests, each of one hour's duration, were made with this apparatus and a Palmer water spray sampler in the various buildings and departments of a large plant making rubber goods. The following determinations were made for each test: Relative and absolute humidity, barometric pressure, weight of total sediment in 50 c.c. sample of 100 c.c. aqueous suspension of particles collected in both machines, weight of organic and inorganic fractions of each 50 c.c. sample, the weight of the aluminum collector before testing, with its accumulated dust charge, and with the dust portion still retained after rinsing out to make up a 100 c.c. aqueous suspension. Counts were made on each suspension. The high tension weight figures were reduced to figures comparable with the rate of air passage through the Palmer machine. The resulting figures when compared with the weight figures of the Palmer determinations, together with a comparison of the counts made on both Palmer and high tension suspensions, showed, on a percentum basis, that the Palmer apparatus collected 59.9 per cent. of total particles counted in the high tension suspensions, 63.3 per cent. of the total sediment, 66.6 per cent. organic portion, and 55.2 per cent. inorganic portion collected by the electrical machine. Based on total sediments collected per 240 cubic feet of air in each process whose air was sampled, the Palmer collected 63 per cent. of the amount retained by the electrical method. The conclusions are that the Palmer apparatus under similar conditions is 61.6 per cent. as efficient as the electrical method (average of above figures). The electrical apparatus used is too bulky for ordinary field work, and suggestions are made for its simplification. It is felt that the findings warrant further study of the electrical precipitation method as applied to the sanitary analysis of air.

DIVISION OF PHYSICAL AND INORGANIC CHEMISTRY

W. E. Henderson, *Chairman*

W. A. Patrick, *Secretary*

The vapor pressures of mercury in the range 120° to 250°: ALAN W. C. MENZIES. Two McLeod gauges containing dry hydrogen over pure mercury were connected with the same pressure reservoir. One of the gauges was raised to the desired temperature and both gauges then operated simultaneously. The vapor pressure of mercury was calculated from the difference, due to mercury vapor, of the pressure readings given by the hot and the cold gauges respectively.

The vapor pressure of tetranitromethane: ALLAN W. C. MENZIES. These measurements covered the range 40° to 126°, thus including the solution of War Problem No. 142 of the National Research Council. The entropy of vaporization of this liquid appears to be normal.

Production of hydrochloric acid from chlorine and water: H. D. GIBBS.

Opening up minerals with phosgene: CHARLES BASKERVILLE. The bleaching of ferruginous silicous bricks by the action of phosgene in plants where that poisonous gas was manufactured has been noted. The useful application of this method of conversion of iron oxides into volatile ferric chloride, with a bleaching, for glass-sand, was suggested by Hulett. Phosgene under the influence of heat is very reactive at temperatures of 450° C. and above. We have converted oxides of aluminum and cerium, insoluble in acids, oxides of zirconium and thorium, insoluble in acids except boiling concentrated sulphuric acid, directly into water soluble chlorides or oxy-chlorides. Bauxite and carborundum yield ferric and aluminum chlorides. Zirconium chloride has been distilled from zircon (silicate), ferric chloride from the contaminating iron being fractioned away due to its greater volatility. The silica remains behind. Thorianite yields soluble thorium and uranium chlorides. The procedure is very simple. The pulverized material is heated in a quartz tube in a stream of gaseous phosgene. It is proposed to extend the work to a large number of the rare-earth minerals.

The preparation of colloidal gold and silver by new reducing agents: HARRY N. HOLMES.

Phase rule studies of the nitrotoluenes: C. H. HERTY, JR.

Compression by adsorption: WILLIAM D. HARKINS and D. T. EWING.

The work done by the attraction between a mercury surface and the surface of an organic substance: W. D. HARKINS, E. H. GRAFTON and D. T. EWING.

The change of molecular kinetic into molecular potential energy: WILLIAM D. HARKINS and L. E. ROBERTS.

The separation of yttrium from the erbium earths: P. H. M. P. BRINTON and C. JAMES.

A new method for the determination of zirconium: M. M. SMITH and C. JAMES.

The effect of lead upon thorium nitrate in aqueous solution: FANNY R. M. HITCHCOCK.

An electrometric study of the neutralization of monocalcium phosphate: GERALD WENDT, A. H. CLARKE and S. M. WEISMAN.

The existence of an ozone form of hydrogen: GERALD L. WENDT and ROB. S. LANDAUER.

Action of thiosulfate on arsenate in acid solution: GEO. SHANNON FORBES and O. J. WALKER. Thiosulphate in excess precipitates As_2S_5 from H_3AsO_4 in HCl (Vortmann, 1889). We combined reactants, varying one concentration at a time, and plotted S_2O_3/H_3AsO_4 against HCl/H_3AsO_4 for incipient precipitation. Given one concentration constant, any curve has a horizontal part along which $S_2O_3/H_3AsO_4 = k = 2$, meeting a nearly vertical part when $HCl/H_3AsO_4 = 2$. This indicates a complex, $H_3AsO_4(HS_2O_3)''_2$, but its average hydrogen content decreases with increasing $S_2O''_3$. Trithionate, with thiosulphate, accompanies As_2S_5 along the "vertical" lines.

$$2H_3AsO_4\cdot(HS_2O_3)_2'' + 6HS_2O_3' = AS_2S_5 + 5S_3O_6'' + 8H_2O.$$

Pentathionate, with sulphite, accompanies As_2S_5 along the horizontal lines.

$$4H^{\cdot} + 2S_2O_3'' + S_3O_6'' = S_5O_6'' + 2SO_2 + 2H_2O.$$

Specific heat determinations with an adiabatic calorimeter: Farrington Daniels and Charles B. Hurd.

The partition of metallic radicals between a salt phase and an alloy phase: Herbert F. Sill.

The retention of bromine by silicic acid gel: W. A. Patrick and E. L. Ryerson.

Determination of the viscosity of pyroxylin solutions: E. F. Higgins and E. C. Pitman.

A slide rule for special cases: F. C. Blake.

Adsorption by precipitates. (II.), the adsorption of anions by hydrous ferric oxide: Harry B. Weiser and Edmund B. Middleton.

The physical character of hydrous ferric oxide: Harry B. Weiser.

Flame reactions of selenium and tellurium: Harry B. Weiser and Allen Garrison.

The catalyst in the oxidation of ammonia: G. A. Perley.

Equilibria in the systems: carbon disulfide, methyl alcohol and carbon disulfide, ethyl alcohol: E. C. McKelvy and D. H. Simpson. The mutual solubility relations of the two pairs of liquids were determined over practically the whole range of concentrations paying particular attention to the purity of the materials used. The following values were obtained for the critical solution temperature and the critical concentration: for methyl alcohol—carbon disulfide + 35.7°, 84.7 per cent. CS_2; for ethyl alcohol—carbon disulfide — 24.4°, 82.7 per cent. CS_2; applications to the determination of small quantities of water in the alcohols and the analysis of anhydrous methyl and ethyl alcohol mixtures were pointed out.

Notes on the estimation of nitrates and nitrites in battery acids: Lily Bell Sefton.

A metal to glass joint and some of its applications: E. C. McKelvy and C. S. Taylor.

Fluorides of cobalt, nickel, manganese and copper: F. H. Edmister and H. C. Cooper. The fluorides of cobalt, nickel, manganese and copper can be prepared by dissolving the hydroxide or the carbonate of the metal in hydrofluoric acid, the same product being obtained, whichever is used. In all cases a crust-like product was obtained. By recrystallizing from water, slightly acidulated with hydrofluoric acid, crystals of the acid fluorides were formed and analyses and measurements of these crystals were made. The analyses indicated that these salts all form an isomorphous series but the crystallographic measurements showed that only the cobalt, nickel and manganese salts are isomorphous, while the copper salt belongs to a different system. The formulas of all four fluorides are of the same acid fluoride type: $MF_2.5HF.6H_2O$. It was surprising to obtain the acid fluoride by recrystallization from water, a basic salt being expected under these conditions. These acid fluorides are not permanent in the air but decompose, losing hydrogen fluoride and, in the case of copper, losing water also, so that the crystals used for analyses must be carefully selected. The formation of a hydrated, non-crystallized crust is distinct from that of the hydrated acid fluoride crystals. In this crust the ratio of metal to fluorine, for the cases of cobalt and nickel, was found to be about one to two, with varying water content. This crust differs from the crystals in solubility and form, as well as in composition. We have arrived at the conclusion that the crust described by Berzelius as containing two molecules of water, the crust later described by Clarke as containing three molecules of water, and the crust and powder obtained by us are the same, the water content being variable and the crystal form being undeveloped. All were obtained in the same manner.

The determination of mercury: H. B. Gordon.

The preparation and uses of $TiCl_3$ solution: F. L. English and H. S. Tanner.

Contrasting effects of sulfates and chlorides on the hydrogen ion concentration in acid solutions: A. W. Thomas and M. E. Baldwin.

Chromophor tautomerism in indicators: William C. Arsem.

Charles L. Parsons,
Secretary

(*To be continued*)

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