

tageously by a well-equipped study collection, comprising not only preparations of adult human structures, but of comparative and embryonic material as well, arranged to illustrate the unity of plan in vertebrate structure.

I think this paragraph states as concisely and clearly as possible the twofold basis underlying all sound study and investigation, not alone in morphology, but in the whole range of the biological sciences, of which medicine is a part, *viz.*, close scientific observation of the actual conditions presented by any problem, and the correlated study of the developmental stages which have produced these conditions.

“Alles Gewordene wird erst verständlich in dem Werden” is the way a great German puts it.

To men who have been trained in these methods and principles, the Jefferson Medical College can safely and confidently intrust her future, in the full assurance that her high reputation will be sustained at their hands.

And so, once again, I bid, on behalf of the trustees and faculty of this institution, God-speed and good fortune to the members of the graduating class.

GEORGE S. HUNTINGTON

COLUMBIA UNIVERSITY

*THE THIRTY-SIXTH GENERAL MEETING OF
THE AMERICAN CHEMICAL SOCIETY*

THE thirty-sixth general meeting of the American Chemical Society was held in Toronto, Canada, during Thursday, Friday and Saturday, June 27-29, the place of meeting being the chemical building of Toronto University. At the opening session Emerson Coatsworth, mayor of the city of Toronto, delivered the address of welcome. This was followed by a short address by Ald. J. J. Graham. A welcome on behalf of Toronto University was extended by Dean Maurice Hutton. These

addresses were followed by a response on behalf of the members of the society by its president, Professor Marsten T. Bogert.

The members of the local committee were untiring in their efforts to provide for the comfort and entertainment of their guests. This meeting will long be remembered because of the generous hospitality extended to the visiting members.

Luncheons were served in the university building on Thursday and Friday by the courtesy of Toronto University. Thursday afternoon the members of the society were the guests of Mr. Edmund B. Osler, M.P., and Mrs. Osler at a garden party in the grounds of Craighleigh, at Rosedale. In the evening the members were entertained by the local committee and the commodore and officers of the Royal Canadian Yacht Club at Centre Island. In the earlier part of Friday afternoon, the society visited various industrial establishments in Toronto. Later in the afternoon the members of the society were the guests of the Lieutenant Governor of Ontario and Mrs. Mortimer Clark at the Government House. Friday evening the members of the society banqueted at McConkey's. On this occasion Professor Maurice Hutton, chairman of the local committee, proved himself to be a very entertaining toastmaster.

Saturday morning the society was taken to Guelph on a special train to visit the Ontario Agricultural College and Experimental Farm. Luncheon was served at the residence by courtesy of the college.

Saturday evening the visiting members began the trip to the Cobalt mining camp on a special train provided for the occasion. Temagami Lake was reached early Sunday morning. After breakfast a boat was in waiting to carry the society thirty-five miles across the lake to the Lady Evelyn Hotel, where dinner was served.

Monday morning the train reached the

mining camps of Cobalt. Here small parties were formed and visits were made to many of the mines in the district. In the evening the visiting members were the guests of the Haileybury Club of Haileybury, Ontario. Returning, the society reached Toronto Tuesday morning.

A summary of the many events of these meetings appeared in the Toronto papers. At the last general assembly a hearty vote of thanks was extended to the local committee and the citizens of Toronto from whom these many courtesies were received.

The number of members in attendance was 150, of whom 120 were visitors. The next meeting will be held in Chicago, beginning December 26.

The following addresses were given before the general assembly:

The Measurement of Chemical Affinity:

WILDER D. BANCROFT.

Chemistry and Canadian Agriculture:

FRANK T. SHUTT.

American Chemical Research: J. BISHOP

TINGLE.

The Vagaries of Beryllium: CHARLES L.

PARSONS.

Deflocculated Graphite: E. G. ACHESON.

These addresses will be printed in full at an early date.

The following papers were read before the society:

PHYSICAL CHEMISTRY

W. D. Bancroft, chairman

Corrosion in Persulphate Solutions: J. W.

TURRENTINE, Cornell University.

Copper is dissolved in persulphate solutions quantitatively. The loss in persulphate content of the solution is equivalent to the copper dissolved. The corrosion of copper in persulphate solution is therefore analogous to the electrolytic corrosion in sulphate solutions. Nickel, aluminum and

iron also behave in persulphate solutions as one would expect from their electrolytic corrosion when made anode in sulphate solutions, *i. e.*, nickel is but slightly attacked in sodium persulphate, but more readily so in ammonium persulphate; aluminum is not attacked at all, and iron is quite readily corroded.

Coefficient of Distribution: LIVINGSTON R.

MORGAN and H. R. BENSON.

The following results are reported:

1. The molecular weights of alcohol in ether and of acetic acid in ether are the same as in water.

2. The molecular weights of acetic acid and alcohol in molten $\text{CaCl}_2 \cdot 6\text{H}_2\text{O}$ and molten $\text{LiNO}_3 \cdot 3\text{H}_2\text{O}$ do not vary with the concentration.

3. The molecular weight of alcohol in benzene varies but slightly with the concentration.

4. The coefficient of distribution is shown to be independent of the heats of solution of the substance in the two solvents.

The Measurement of Chemical Affinity:

W. D. BANCROFT.

The heat of reaction is not a measure of chemical affinity; but Gibbs has shown that the electromotive force is a measure for the case of completely reversible systems. Cases which have been studied experimentally are: precipitation of metal by metal; allotropic forms of metals; amalgam cells; stable and instable salts; metathetical reactions; oxidation and reduction cells; light. When the gas pressures or the osmotic pressures are known for a system in equilibrium, it is possible to calculate the work done against the chemical affinity by displacing the equilibrium, provided the equilibrium formula is known. This gives a relation between the electromotive force and the equilibrium constant, which has been tested for: precipitation of metal by metal; amalgam cells; stable and instable

salts; metathetical reactions; oxidation and reduction cells. The method of calculating chemical affinity from the equation for equilibrium has then been applied to the cases in which electromotive force measurements are impossible or inaccurate.

There is no way at present to measure chemical affinity in the case of an apparently irreversible reaction, in other words, in the overwhelming majority of instances. It is suggested that the best line of attack is the study of the electromotive forces of irreversible cells made up of oxidizing and reducing agents.

The Stable Hydrates and Acid Salts of Ferrous Sulphate: FRANK B. KENRICK, University of Toronto.

The object of the experiments was to determine the composition of the ferrous sulphates stable at ordinary temperatures in systems containing the components FeO , SO_3 and H_2O . Mixtures of varying proportions of these components together with a little ammonium sulphate were shaken until equilibrium was reached, and the liquid and moist solid phases analyzed. From these results the composition of the solid phase was calculated, the amount of liquid adhering to the solid being determined from the quantity of ammonium found.

The existence of the following chemical individuals, besides the ordinary green vitriol, has been proved with a fair degree of certainty: $\text{FeO} \cdot \text{SO}_3 \cdot 4\text{H}_2\text{O}$, $\text{FeO} \cdot \text{SO}_3 \cdot \text{H}_2\text{O}$, $2\text{FeO} \cdot 3\text{SO}_3 \cdot 2\text{H}_2\text{O}$, $\text{FeO} \cdot 2\text{SO}_3 \cdot \text{H}_2\text{O}$ and $\text{FeO} \cdot 4\text{SO}_3 \cdot 3\text{H}_2\text{O}$.

The Mechanism of the Acetacetic Ester Synthesis: W. LASH MILLER, University of Toronto.

The rates of the condensation of oxalic ester with acetone and with ethyl acetate have been measured by Mr. Clark and Mr. Cooke, the progress of the reactions being determined by colorimetric measurements

after adding ferric chloride. Some interesting features of the behavior of the red coloring matter have been studied incidentally.

Mutual Solubility of the Chlorides of Calcium and Sodium: W. O. ROBINSON, Bureau of Soils, Washington.

The complete isotherm of the system calcium chloride, sodium chloride and water at 25° has been determined. The solubility of calcium chloride hexahydrate is very greatly depressed by sodium chloride. The "constant solution" contains 78.49 grams calcium chloride and 1.846 grams sodium chloride to 100 grams of water. The hexahydrate of calcium chloride inverts to the tetrahydrate, in presence of an excess of sodium chloride at 29° .

The Measurement of the Vapor Pressure of Solutions with the Morley-Brush Gauge: O. F. TOWER, Adelbert College, Cleveland.

The method is a differential one. The gauge was described, and the results of measurements with solutions of potassium chloride and cane sugar were given. The paper was of a preliminary nature.

Absorption of Water Vapor by Soils: F. E. GALLAGHER and H. E. PATTEN, Bureau of Soils, Washington.

The absorption of water vapor by quartz flour, a soil separate, and typical soils, has been studied with special reference to the controlling conditions. The rate of approach to equilibrium between soil and water vapor has been followed at various degrees of humidity, and these equilibrium points determined. The amount of water absorbed increases with the humidity, but not in a simple mathematical relation. The equilibria between soils and atmospheres saturated with water vapor were studied over a temperature range from 25°C . to 100°C ., and, contrary to Hilgard's results,

it was found that the amount of water absorbed decreased with increasing temperature. This confirms the results obtained by earlier investigators for the absorption of water vapor as well as for gases in general.

Determination of Solid Phases in Four-Component Systems: J. M. BELL, Bureau of Soils, Washington.

When only one solid phase is present in a four-component system, a modification of the Bancroft method for the determination of the composition of the solid may be employed. By the use of two triangular diagrams in each of which one of the ordinates represents the sum of the percentages of two components, the percentage composition of the solid may be determined graphically.

Double Sulphates of Ammonium and Calcium: J. M. BELL and W. C. TABER, Bureau of Soils, Washington.

In a recent paper d'Ans has claimed that the formula attributed by us to the double sulphate of lime and ammonium, viz., $\text{CaSO}_4 \cdot (\text{NH}_4)_2\text{SO}_4 \cdot 2\text{H}_2\text{O}$, should have only one molecule of water. It has been found in our later experiments that washing the double salt with the liquids which d'Ans has used, causes a rapid decomposition of the compound, and it has been shown by further experiments that the formula first proposed by us is the correct one.

Reactions between Copper Sulphate and Lime: J. M. BELL and W. C. TABER, Bureau of Soils, Washington.

When lime is added in excess to copper sulphate solutions, the solid phases consist of calcium hydroxide, gypsum and blue copper hydroxide, which are thus shown to be the constituents of Bordeaux mixture. When the lime is added in just sufficient quantity to precipitate all the copper and

the solution is faintly alkaline, there is an olive-green copper hydroxide precipitated.

When lime is added in insufficient quantity to precipitate all the copper, the precipitate consists of a mixture of gypsum and a basic sulphate of copper. The basic sulphates of copper have been investigated by adding copper oxide to various copper sulphate solutions. It was found that the composition of the solid was variable and was intermediate between the two generally accepted basic sulphates of copper.

When there is neither acid nor base in excess, the study becomes one of the mutual solubility of copper sulphate and gypsum. The solubility of gypsum passes through a minimum as the concentration of copper sulphate increases.

The Solubility of Calcium Carbonate in Certain Aqueous Solutions: F. K. CAMERON and W. O. ROBINSON, Bureau of Soils, Washington.

Calcium carbonate is much more soluble in potassium sulphate solutions than in potassium chloride solutions. In solutions of potassium chloride it passes through a maximum. When the system is saturated with carbon dioxide at atmospheric pressure the calcium carbonate is again more soluble in the more dilute potassium sulphate solutions than in those of potassium chloride, where again it passes through a maximum. In the more concentrated potassium sulphate solutions syngenite is formed.

Copper as Anode in Chloride Solutions: SAUL DUSHMAN, University of Toronto.

Increasing the concentration of the chloride, or rotating the anode, increases the proportion of cuprous salt formed. The experiments are in agreement with the supposition that cuprous and cupric salts are formed in such proportions that the solution at the surface of the anode is in equilibrium with metallic copper.

The Ignition Temperatures of Gaseous Mixtures: K. GEORGE FALK, Columbia University.

The method of determining the ignition temperatures of gaseous mixtures by calculating the rise in temperature, produced by the adiabatic compression of the gases, by means of the formula

$$\frac{T_2}{T_1} = \left(\frac{V_1}{V_2} \right)^{k-1},$$

in which V_1 and V_2 denote the initial and final volumes of the mixture, T_1 the initial temperature, T_2 the ignition temperature, and k the ratio of the specific heats of the gases at constant pressure and constant volume, was applied to mixtures of carbon monoxide and oxygen and the following results obtained:

T_2 (absolute)		
1	CO + O ₂	911
2	CO + O ₂	879
4	CO + O ₂	907
6	CO + O ₂	1002

The Theory of "direct" Determinations of Migration: W. LASH MILLER, University of Toronto.

The relations between concentrations of solutions, transport numbers, and motion of the boundary, may be deduced without introducing *time* or functions dependent on it (conductivity, mobility).

This method of treatment makes the relations between the direct and the analytical methods very clear, and shows how the direct method may be applied to solutions of weak acids, etc., without reference to their degree of dissociation.

A Comparison of Collodion, Parchment Paper and Gold-beater's Skin Membranes with Porcelain: S. LAWRENCE BIGELOW, University of Michigan.

Methods for making collodion membranes were investigated and developed.

Some colloids were separated from crys-

talloids, using the three above-mentioned membranes. The progress of dialysis was followed by the conductivity method, and it was found to occur fastest with gold-beater's skin, slower with collodion and slowest with parchment paper. The results indicate that collodion is to be preferred to parchment for dialyzing.

The rates at which water permeated the above-mentioned substances under different pressures and temperatures were determined. The "permeabilities" were expressed in cubic millimeters of water passing through one square centimeter of membrane per minute. When these values for permeability were laid off as ordinates, against corresponding pressures and temperatures, respectively, as abscissæ, straight lines were obtained for pressures, nearly straight lines for temperatures. This is what would be expected if Poisseuille's formula for the passage of liquids through capillaries applied. More significant than the application of the formula is the fact that the "picture" for porcelain under the same conditions so strongly resembles those for the three membranes. This is evidence, though not by any means conclusive, in favor of the view that the passage of water through membranes is a capillary process.

The article will appear shortly in one of the journals.

The Equilibrium Diagram for the Series Copper-Aluminum: B. E. CURRY, Cornell University.

The freezing point curve for this series consists of seven branches. Six series of solid solutions and one compound, CuAl₂, separate from the melt. The β and δ series of solid solutions are instable at the lower temperatures.

Electrolytic Separation of Silver from Copper: H. W. GILLET, Cornell University.

Silver can be separated electrolytically from copper in a tartrate solution by a constant voltage method. Vigorous stirring is essential if a good deposit of silver is to be obtained.

Some Unique Conductivity Curves: EDWARD C. FRANKLIN and HARRY D. GIBBS, Leland Stanford University.

With solutions of silver nitrate in methylamine the molecular conductivity first increases with increasing dilution, then passes through a maximum followed by a minimum. This abnormal behavior is probably the resultant of three factors, the self-ionization of the salt, the dissociating power of the solvent and the viscosity of the solvent.

A Dynamic Method for Determining the Temperature Pressure Curves of some Monovariant Systems of the Second and Higher Orders and its Application to a Dissociation: W. D. HORN, Bryn Mawr. This paper will appear in full in the *American Chemical Journal*.

Recent Advances in Electrolytic Analysis: EDGAR F. SMITH. Reported by title.

Electrical Conductivity of Solutions in Ethylamine: F. L. SHINN. Reported by title.

INDUSTRIAL CHEMISTRY

W. H. Ellis, chairman

Some Reactions during Water Treatment: EDWARD BARTOW and J. M. LINDGREN, The University of Illinois.

A series of tests was made to determine the amount of calcium and magnesium removed by each addition of reagent. The mineral matter in the water consisted almost entirely of the bi-carbonates of sodium, magnesium and calcium.

It was found that after the neutralization of carbon dioxide the calcium is removed. A reaction then takes place between the

reagent and sodium bicarbonate, when present, and finally, magnesium is removed. The reactions within the limits of solubility of the precipitates take place in order almost quantitatively, with but little overlapping.

The experiments suggest the necessity for considering the presence of sodium bicarbonate in water treatment.

Some Experiments to Determine the Amount of Volatile Matter in Coal: A. BEMENT, American Trust Building, Chicago.

To ensure that no combustion would occur, an inert gas was continually passed through the crucible under slight pressure during the heating process. For convenience in preparation hydrogen was employed and the charge was heated by an ordinary Bunsen burner. The result was, that even after heating for periods of 100 and 120 hours, a loss still continued, and the indications were that it would have gone on for additional periods of equal lengths of time, at least.

Deflocculated Graphite: EDWARD G. ACHE-SON, The Acheson Company, Niagara Falls.

Experiments on clays, carried out in the year 1901, showed that by adding vegetable extracts—gallotannic acid, extract of straw—to moderately plastic weak clays, their plasticity was increased, the amount of water required to produce a given degree of fluidity was lessened, and the size of the particles in suspension was much reduced.

The effect on finely divided graphite is much the same; and by the use of a little gallotannic acid and a few drops of ammonia, suspensions may be prepared which last indefinitely. Extensive tests are now being made to determine the value of this "deflocculated graphite" as a lubricant, with most encouraging results.

The Optical Rotation of Spirits of Turpentine: CHAS. H. HERTY, University of North Carolina.

In collaboration with the U. S. Forest Service the alio-resins from individual trees of the species *Pinus palustris* (long leaf) and *Pinus heterophylla* (Cuban) have been studied throughout a full season. The optical rotation of the several volatile oils shows wide divergence among trees of the same species. In the case of *P. palustris* the oils are generally dextro-rotatory, though one was found to be lævo-rotatory. The oils from *P. heterophylla* were found to be lævo-rotatory, though varying widely among the individual trees of this species. In every case, however, the rotation was found to be practically constant throughout the year.

The Volatile Oil of Pinus Serotina: CHAS. H. HERTY, University of North Carolina.

This oil, obtained by distillation of the alco-resin of the pond pine, is shown to consist chiefly of lævo-limonene. Its physical constants are given and the tetra-iodo addition product of the limonene prepared.

The Estimation of Carbon in Iron and Steel: E. P. MOORE and J. W. BAIN, University of Toronto.

During the solution of iron and steel in acidified potassium cupric chloride, it has been suspected that there is an escape of volatile hydrocarbons. The evidence has been based upon indirect methods of analysis; and by arranging for the direct estimation of any evolved hydrocarbons, it has been found that there is a constant loss during the operation, of such slight magnitude, however, as to be negligible for ordinary analytical purposes.

The Examination of Linoleum: PERCY H. WALKER and E. W. BOUGHTON.

Chemical tests as to quality of linoleum are of little value. The loss by abrasion

is of value, though when taken alone it may lead to wrong conclusions; if, however, the appearance of the samples before and after abrasion is taken into consideration this test becomes probably the best available.

Canadian Shales and Products: CHARLES BASKERVILLE and W. A. HAMOR.

Ultramarine and Pyrophyllite: CHARLES BASKERVILLE. Reported by title.

The Constants and Variables of the Parr Calorimeter: S. W. PARR.

Pure Coal and the Deterioration of Coal Samples: S. W. PARR and W. F. WHEELER. Reported by title.

Determination of Benzene in Illuminating Gas: L. M. DENNIS and ELLEN S. MCCARTHY. Reported by title.

A Furnace for Ceramic Use: FRED BONNET, JR.

A down-draught furnace built on the regenerative principle. The construction is of three circular seggars one inch thick, the inner one being eight inches in diameter. A temperature of 1,400° C. can be obtained in an eight-hour run.

INORGANIC CHEMISTRY

C. L. Parsons, chairman

Sodium Alum: W. R. SMITH.

A résumé of the conflicting statements in chemical literature regarding sodium alum, and descriptions of experiments showing that this alum exists below 33 degrees, but that it does not exist above that temperature; also results on new data for solubility, preparation, etc.

On the Non-existence of Clarke and Keblér's Cadmium Iodide: J. F. SNELL, University of Cincinnati.

Crystallization of cadmium iodide from hydriodic acid, decolorized by cadmium, resulted in formation of products of low

specific gravity, similar in behavior to those described as cadmium iodide by Clarke and Kebler (*Am. Chem. J.* **5**, 235, 1883), but these on analysis proved to contain some hydriodic acid and water. It is concluded that there is no satisfactory evidence of the existence of a form of cadmium iodide of lower specific gravity than 5.6.

Platinum Resistance Furnace for Melting Points and Combustions: S. A. TUCKER.

A description of a new electric furnace consisting of a quartz tube, heated by a spiral of platinum tape, the whole being surrounded by infusorial earth enclosed in an asbestos box. Most excellent results on combustions and on the determination of melting points were obtained in this apparatus.

Determination of Carbon Dioxide: W. H.

WAGGAMAN, Bureau of Soils, Washington.

The apparatus differs from that previously described by Cameron and Breazeale, by having an Ostwald regulator to control the flame under the decomposition flask, and by having a coil of tubing to cool the upper portion of the flask. Fairly accurate results for CO_2 from several organic compounds and carbonate minerals have been obtained in forty minutes.

Some New Compounds of Indium: F. C.

MATHERS and C. C. SCHLEUDERBERG, Cornell University.

This paper outlines the methods of preparation and properties of some new compounds of indium.

Indium perchlorate was prepared by dissolving metallic indium in perchloric acid. The solution was allowed to crystallize in a vacuum desiccator.

Indium iodate was prepared by precipi-

tating a solution of indium chloride with potassium iodate. It is a white crystalline substance, soluble in 1,500 parts of water and 150 parts of 1:5 nitric acid. It is decomposed by hydrochloric acid.

Indium selenate was formed by dissolving indium hydroxide in selenic acid which had been prepared by the electrolysis of copper selenate.

Indium caesium selenate (alum) was prepared by crystallizing a solution of *indium selenate* and *caesium selenate*.

The Separation of Iron from Indium: F.

C. MATHERS, Cornell University.

Nitroso β -naphthol quantitatively precipitates iron from an acetic acid solution while indium remains in solution. Colorimetric analysis of the indium solution after the removal of the iron showed that the content of the iron varied from mere traces to .025 per cent.

A System of Qualitative Analysis for the

Common Elements: The Aluminum and

Iron Groups: A. A. NOYES, W. C. BRAY

and E. B. SPEAR. Presented by E. B. SPEAR.

This is a continuation of the work already published in the *Journal of the American Chemical Society* and will appear later.

Distribution of Mineral Nutrients in Soil

Separates: G. H. FRAILYER, J. G. SMITH

and H. R. WADE. Reported by title.

Potassium Ammonozincate: EDWARD C.

FRANKLIN, Stanford University.

The compound $\text{Zn}(\text{NHK})_2\text{NH}_3$ has been prepared and studied. The analogy between the ammonia and water systems of bases, acids and salts is shown to extend to the formation of the ammonia analogue of potassium zincate. This is a continuation of previous work along similar lines.

Separation of Lithium Chloride from the Chlorides of other Alkalies: L. KAHLBERG and F. C. KRAUSKOPF, University of Wisconsin.

The separation depends on the solubility of lithium chloride in pyridine while the other chlorides are insoluble in this reagent. The presence of three per cent. of water is not detrimental.

The Influence of Acid Residue upon the Stability of Cuprammonium Salts: W. D. HORN, Bryn Mawr.

This paper will appear in an early number of the *American Chemical Journal*.

An Anomalous Behavior in the Radioactivity of some Uranium Compounds: RICHARD B. MOORE and HERMAN SCHLUNDT, Butler College, Indianapolis.

When a 4-N solution of ammonium carbonate solution is added in excess to a saturated solution of uranyl nitrate, a yellow well-crystallized carbonate of uranium and ammonium separates out. This salt was found to increase very considerably in activity on standing. It was found that the salt on standing lost in weight and the same effect could be obtained by heating, the increase in activity being directly proportional to the loss in weight. The nitrate, acetate and sulphate of uranium on heating behaved in a similar manner.

On heating the complex uranium ammonium carbonate, ammonia water vapor and carbon dioxide are evolved simultaneously.

The initial increase in activity that was observed on the double carbonate does not indicate that a new radioactive type of matter had been separated from uranyl nitrate by a modification of the method of Crookes. The loss in weight decreases the absorption of the α -rays and the increase in activity consequently results.

Tellurium-Tin Alloys: HENRY FAY, Massachusetts Institute of Technology, Boston.

Tin and tellurium unite to form the compound SnTe , which melts at 769° . This compound forms a eutectic with tellurium which contains 85 per cent. of tellurium and which melts at 399° . It also forms a eutectic with tin, which melts at practically the same temperature as tin, 232° . The composition of this second eutectic has not been definitely determined, but it has been established that it contains less than 1 per cent. of tellurium.

On the Properties of Sodium Bismuthate: HENRY FAY and HELEN R. HOSMER, Massachusetts Institute of Technology, Boston.

A complete study of the bismuth-oxygen ratio in various preparations of the so-called sodium bismuthate was made. From the results obtained it is highly probable that sodium bismuthate does not exist as such except in the fusion of bismuth oxide with sodium hydroxide and sodium peroxide. It is impossible to identify it absolutely here on account of the rapidity with which it hydrolyzes into sodium hydroxide and a mixture of tetravalent and pentavalent bismuth oxides.

Of the various methods for the preparation of sodium bismuthate, the fusion method alone is capable of oxidizing the bismuth to its highest form.

Vanadium Sulphide, Patronite and its Mineral Associates from Minasragra, Peru: W. F. HILLEBRAND and W. T. SCHALLER.

The Mercury Minerals of Terlingua, Texas: W. F. HILLEBRAND and W. T. SCHALLER. Reported by title.

The Reaction between Hydrazine Sulphate and Ammonium Vanadate: A. W. BROWNE and F. F. SHETTERLY.

This article will appear in the *Journal of the American Chemical Society*.

Separation of the Yttria Earths: BENTON DALES. Reported by title.

ORGANIC CHEMISTRY

J. Bishop Tingle, chairman

- I. *On the Affinity Constant and Constitution of Several Urazoles*. II. *On the Velocity Constants of the Reactions between Alkyl Halides and Urazoles*: S. F. ACREE and G. H. SHADINGER.

The affinity constants of phenyl-urazole and 1-phenyl-4-methyl-urazole are 0.00001, that of 1-phenyl-2-methyl-urazole is 0.00000006, that of 1-phenyl-3-ethoxy-urazole is 0.00000004, while the constants for phenyl-3-thio-urazole and 1-phenyl-3-thio-4-methyl-urazole are 0.017. New evidence has thus been produced in favor of the view that phenyl-urazole and phenyl-3-thio-urazole are tautomeric compounds.

Work on the reactions of alkyl halides with urazoles, hydroxides, carbonates, thioacetates, etc., proves that the alkyl halide reacts with the anion of the urazole, hydroxide, etc.

The alkyl halides do not seem to form alkyl derivatives through the intermediate dissociation into alkyl and halide ions.

The alkyl halides do not seem to react with salts by first uniting with the cathion and forming a complex cathion which then reacts with the anion.

The alkyl halide seems to react as a neutral molecule with the anion of the substance which is alkylated.

The Synthesis of 7-amino-4-Quinazolones from m-toluylenediamine: M. T. BOGERT and V. J. CHAMBERS, Columbia University.

The diamine was acetylated, the toluene methyl group oxidized to carboxyl, the acetanthranil prepared from this di-acet-

amino acid, and quinazolones produced by condensing this acetanthranil with primary amines.

An Investigation of Certain Properties of the Sulphanilic Acids: V. J. CHAMBERS, Columbia University.

A preliminary study of certain reactions of o-sulphanilic acids, together with the determination of the relative stability of the acyl derivatives of o-, m- and p-sulphanilic acids.

Studies in Nitration III. Nitration of N-Acylated Compounds of Aniline derived from Monobasic Acids: J. BISHOP TINGLE and F. C. BLANCK, Johns Hopkins University.

The experiments were carried out under the same general conditions as were employed in the nitration of the N-alkyl derivatives of aniline; nitric acid alone, and in admixture with acetic acid, oxalic acid, trichloroacetic acid and concentrated sulphuric acid, respectively, being employed. The following acyl-derivatives were used: formanilide, acetanilide, trichloroacetanilide, propanilide, stearanilide, benzanilide, meta-brombenzanilide, orthotolylsulphoneanilide, phenylsulphoneanilide, phenylacetanilide, picranilide. All the products of the reaction have not yet been fully identified.

On the Constitution of Phenyl-urazole (III.): A Contribution to the Study of Tautomerism: S. F. ACREE, Johns Hopkins University.

Experimental work and the application of the mass law show that the relative amounts of the two stable derivatives formed in the reaction of a tautomeric compound, existing in two tautomeric forms in equilibrium, and another reagent depend upon (1) the relative reactivity of the two tautomeric forms towards the other reagent, (2) the ratio between the amounts of the two tautomeric forms when they are

in constant equilibrium with each other, and (3) the rapidity of the change of each of these tautomeric forms into the other as the equilibrium between them is disturbed.

Various phases of the equilibrium conditions existing in solutions of tautomeric acids or bases, or their salts, have been studied by the application of the mass law.

The conditions under which normal and abnormal hydrolysis of salts of tautomeric compounds can be determined have been discussed.

A large number of derivatives of phenylurazole have been made and studied.

Studies in Catalysis: S. F. ACREE and J. M. JOHNSON, Johns Hopkins University.

The study of the rearrangement of acetyl-chloramino-benzene in the presence of acids has shown that the velocity is proportional not to the concentration of the hydrogen ions, but to the square of the concentration of the hydrogen ions.

The study of the reactions of carbonyl compounds with hydroxylamine and hydroxylamine hydrochloride has shown that the reaction is a reversible catalytic one, and that the equilibrium point is changed by a change in the concentration of the hydrogen ions.

A general discussion of catalytic reactions has shown why the three so-called laws of catalysis were deduced from the experimental material previously available, and under what conditions they do or do not hold.

The Use of Benzyl Cyanide in the Synthesis of Certain Aromatic Succinic and Glutaric Acids: S. AVERY, F. W. UPSON and G. R. McDOLLE, University of Nebraska.

Analogous to sodium malonic ether, sodium benzyl cyanide condenses with aldehyde cyanhydrins to form products which on hydrolysis yield alkyl succinic acids. S-diphenyl succinic and the heretofore un-

known s-isopropyl phenyl succinic acid were formed by the above reactions.

With the ethereal salts of unsaturated acids, sodium benzyl cyanide forms condensation products analogous to those obtained by Michael's reaction. On condensing with ethyl cinnamate and hydrolyzing, two stereo isomeric phenyl glutaric acids were formed.

Mechanism of the Claisen Condensation:

J. BISHOP TINGLE and E. E. GORSLINE, Johns Hopkins University.

The condensation product of ethyl phthalate and camphor exists in the keto and enolic forms.

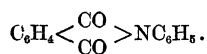
A study has been made of the action of sodium and of sodium ethylate on ethyl benzoate. Sodium ethylate is eliminated and, apparently, a sodium compound, $C_6H_5C(ONa):C(ONa)C_6H_5$, is formed. With water this is converted quantitatively into benzyl alcohol and benzoic acid, in equi-molecular proportion. Ether does not exert any apparent catalytic effect on the formation of the above sodium compound of ethyl benzoate; and sodium ethylate, free from alcohol, is without action on ethyl benzoate. Experiments in which the quantity of sodium was varied show that the yield of condensation product is greatly increased by treating the ester with two atomic proportions of sodium and then adding sodium camphor.

Intermolecular Condensation in the Phthalic Acid Series: J. BISHOP TINGLE and B. F. LOVELACE, Johns Hopkins University.

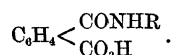
At the last meeting of this society Tingle and Cram reported that phthalanilic acid,



in presence of aniline and alcohol, is converted at a temperature below the boiling point of the latter into phthalanil,



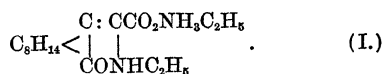
The investigation has been continued by us in two directions; on the one hand, we have studied the effect of bases other than aniline on the condensation, and, on the other hand, have endeavored to ascertain the result obtained by substituting for phenyl some other group in the compound,



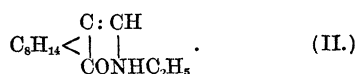
Results show that by the use of pyridine or quinoline instead of aniline the phthalanilic acid is transformed into phthalanil as readily as by the use of aniline. Consequently the condensation must be due to salt formation and not to the reactivity of the carbonyl group.

Action of Primary and Tertiary Amines on Camphoroxalic Acid: J. BISHOP TINGLE and L. F. WILLIAMS, Johns Hopkins University.

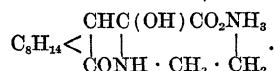
Ethyl-amine yields a compound of the type



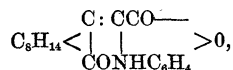
When heated above its melting point it yields the derivative,



Ethylene diamine reacts to some extent like a secondary amine, because the elements of water are not eliminated; the condensation compound has the formula,



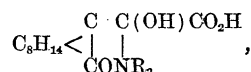
Paranitraniline gives a derivative of the type (II.) above. Orthoaminophenol yields a lactone,



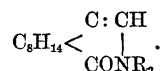
whereas paraminophenol gives a compound of type (I.).

Action of Secondary Amines on Camphoroxalic Acid: J. BISHOP TINGLE and L. F. WILLIAMS, Johns Hopkins University.

The diketone employed was camphoroxalic acid. The following amines were investigated: diamylamine, diisoamylamine, diisobutylamine. These all gave compounds of the type,



which, when heated above the melting point, evolved carbon dioxide and water, giving the compound



Dibenzylamine yielded *directly* a derivative of this second type. The same is true of methylaniline, ethylaniline and of acetylphenylhydrazine. Benzylethylamine, on the other hand, gave compounds of both types.

The Action of Benzene and Selenic Acid: HOWARD W. DOUGHTY, University of Wisconsin.

The following compounds were made and studied: $(\text{C}_6\text{H}_5\text{S}_2\text{O}_3)_2\text{Ba}$, $(\text{C}_6\text{H}_5\text{S}_2\text{O})_2\text{Ba}$ and $\text{C}_6\text{H}_5\text{S}_2\text{O}_3\text{H}$. The acid product begins to break down at 182° .

Tetrachlorgallein and some of its Derivatives: W. R. ORNDORF and T. G. DELBRIDGE. Reported by title.

Studies in Nitration IV. Nitration of N-Acylated Compounds of Aniline derived from Dibasic Acids: J. BISHOP TINGLE and F. C. BLANCK, Johns Hopkins University.

The following aniline derivatives were investigated: oxalic acid, oxanilide, succinanilic acid, succinanil, succinanilide, tartranilide, phthalanil, phthalanilic acid. In general, the results were in agreement with those recorded in the other papers of this

series. The position taken up by the entering nitro group appears to depend not only on the nature of the groups already present in the molecule, but also, and to a very marked extent, on the strength of the acid which is mixed with the nitric acid.

Studies in Nitration II. Nitration of Aniline and of its N-Alkyl and Aryl Derivatives: J. BISHOP TINGLE and F. C. BLANCK, Johns Hopkins University.

A large number of experiments have been carried out with nitric acid alone and when mixed with glacial acetic acid, oxalic acid, trichloroacetic acid and concentrated sulphuric acid, respectively, in order to ascertain its action on aniline, methyl-aniline, ethyl-aniline, diethylaniline, dimethylaniline and diphenylamine. It is found that oxalic acid is without apparent influence on the reaction. As regards aniline itself, it is shown that aniline nitrate is always the first product formed during nitration; that, in presence of a slight excess of concentrated nitric acid, a colored dehydration compound is obtained. This is analogous to certain colored derivatives of the nitrophenols and is being further investigated.

Conditions affecting the Claisen Condensation: J. BISHOP TINGLE and E. E. GORSLINE, Johns Hopkins University.

Most of the experiments were carried out with camphor, but in some cases other ketones were used. The results show that calcium or sodamide react only at relatively higher temperatures and the presence of a little alcohol is necessary; with sodium as the condensing agent the time required for the reacting substances to attain equilibrium is a function of the temperature. The effect of variation in the solvent is quite marked. The esters of the higher aliphatic monobasic acids appear to react somewhat differently from the esters of

similar acids belonging to the aromatic series.

AGRICULTURAL, SANITARY AND BIOLOGICAL
CHEMISTRY

Frank T. Shutt, Chairman

Unification of Terms used in Reporting Analytical Results: CYRIL G. HOPKINS, University of Illinois.

It is pointed out that there is great lack of uniformity in existing literature in the terms used for reporting analytical results, especially in agricultural chemistry.

In view of these facts, and providing concurrent action is taken by the Association of Official Agricultural Chemists and by the American Chemical Society, the Association of American Agricultural Colleges and Experiment Stations has endorsed a report favoring the adoption of the element system for reporting analytical results in the analysis of soils, ashes and fertilizers, as rapidly as possible.

In the case of foodstuffs, condiments, etc., it is recommended in the statement of analytical results to use names of compounds or groups of compounds actually present as such in the material, this being in accordance with the present general practise.

On a Method of Applying Moss Litter for Deodorizing and Desiccating Purposes: THOMAS MACFARLANE. Reported by title.

The Determination of Boric Acid in Common Salt: W. D. BIGELOW and CLEMENT S. BRINTON, Bureau of Chemistry, Washington.

The authors collected about eighty samples of common salt, representing all grades, from the various manufactures over the United States, and examined them for the amount of boric acid present, using a modification of Howard's method for turmeric

in mustard (SCIENCE, Vol. 19, page 583). Of the eighty samples examined only six contained boric acid to exceed 1 part in 100,000. Five of these samples were examined for boric acid by Thompson's method, with the following results: 0.020 per cent., 0.096 per cent., 0.202 per cent., 0.064 per cent., 0.080 per cent. All of the samples which ran high in boric acid were obtained from the western part of the United States, and the majority from Nevada.

Solubilities of Food Colors: EDWARD GUDEMAN, Suite 903-4, Postal Telegraph Building, Chicago.

Preliminary report on collaboration work with Professor E. R. Ladd, Associate Referee on Colors, Association Agricultural Official Chemists.

The solubilities of three coal tar colors, Oraline Yellow, Turquine Blue and Amarant Red, and of three vegetable colors, Accoline Yellow, Lazuline Blue and Cladonal Red, were determined in cold and hot water, muriatic acid (1 per cent.), ammonia (1 per cent.), ether, petroleum ether, ethyl, methyl and amyl alcohols, acetone, acetic and amylic ethers, carbon disulphide, class; and conclusions drawn were that solubilities of the colors themselves and of the extraction values of the solvents are no criterion to judge the character nor the class of the colors, and that such methods are of no value in differentiating between coal-tar and vegetable colors.

Determination of Boric Acid in Butter:

ROBERT HARCOURT. Reported by title.

Meat Extracts and Juices: W. D. BIGELOW and F. C. COOK. Reported by title.

Notes upon Composition and Analysis of 100 American Honeys: C. A. BROWNE, JR. Reported by title.

B. E. CURRY,
Secretary

NEW HAMPSHIRE COLLEGE

SCIENTIFIC BOOKS

A Laboratory Manual of Invertebrate Zoology.

By GILMAN A. DREW, Ph.D., professor of biology at the University of Maine. Pp. vii + 201. Philadelphia and London: W. B. Saunders Company, 1907. \$1.25 net.

For the majority of our students the value of our biological courses lies not in the acquisition of a more or less detailed knowledge of a series of animals or plants. Such a knowledge is, of course, a necessity in training the specialist, but the average student soon forgets the number of podobranchs and pleurobranchs of the lobster, never remembers long the exact position of the synergides and in six months' time can not tell whether yellow or green is the Mendelian dominant in peas. The greatest gain to the student is in a training of the powers of observation and the cultivation of a spirit of independence which does not accept a thing as so upon the *ipse dixit* of the text.

From this standpoint Drew's laboratory manual seems most excellent pedagogically. It does not tell him what he will find (and usually he will find it if so told), but it asks him what he does find and refers him to the specimens for the answers. In the hands of the competent teacher the resulting training is most excellent, while such directions in the hands of an incompetent instructor—well, such books will force the incompetent into other lines.

The proof of the pudding, says the old saying, lies in chewing the string. Just so the real test of this as of all other class books, lies in its actual use with students. As far as one may judge from reading the pages, Dr. Drew has produced a work of real value. Twelve groups of invertebrates are recognized, and in each, detailed directions for the study of one or two forms are given and accompanying these are hints for the external study of allied forms. If these are followed out they afford ample illustration of the tables of classification with which each group is introduced. More matter is introduced than can be used in the ordinary year's course, but this is not a disadvantage, as it allows a choice of forms according to the exigencies of location,