The consideration that saves the situation is that the entire effective inertia, no matter what may be its source, and where it may be located, is, as a fact, included in the calculations when mass, momentum, kinetic energy, etc., are regarded as attaching to the electron. This process of expression becomes feasible in terms that involve a physical property of the electron itself (its electric charge) and its kinematical elements (acceleration, velocity, etc.); so that to this extent the parallel is preserved with the mass-factor and the kinematical factors of ordinary mechanics. But it may be well, at intervals, while we take advantage of the undoubted convenience in these methods of presentation, to remind ourselves of their artificial nature, and then to employ their fictions consciously.

Should the suggestion prove true that all mass is an electromagnetic phenomenon, we shall be brought to confess that we have been using some fictions unconsciously; for example, in attributing kinetic energy to a mere cannon-ball which is more nearly a clearing-house for energies spread through cubic kilometers of medium. This would add only one item to a list already long enough, where the result of completer analysis is to substitute a complex process for the superficial and simple one. The tendency to identify quantities of energy with limited volumes of "bodies" seems strong enough to carry a good load of artificial convention. Witness potential energy, entropy, specific heat for constant pressure.

FREDERICK SLATE
UNIVERSITY OF CALIFORNIA

THE THIRTY-EIGHTH GENERAL MEETING OF THE AMERICAN CHEMICAL SOCIETY

I.

THE thirty-eighth general meeting of the American Chemical Society was held at New Haven during June 30, July 1 and 2, in North Sheffield Hall, of Sheffield Scientific School, Yale University. President Hadley welcomed the visiting members and extended the buildings and accessories for their use and general convenience.

On Tuesday and Thursday afternoons, invitations were extended to the chemists to visit the rubber Works of L. Candee & Co., in New Haven, and the works of the New Haven Gas Light Co. Wednesday afternoon a special excursion was made to Ansonia to visit the works of the Ansonia Brass and Copper Company and the Coe Brass Manufacturing Company; at all of these places the visitors were courteously received and shown through the works in a very thorough and painstaking manner.

On Tuesday evening the local members of the society extended a complimentary smoker to the visitors at the Graduate Club House. On Wednesday a subscription shore dinner was given at the "Momanguin" on the east shore. Many of the visitors made use of the excellent salt-water bathing facilities at this place.

The attendance at this meeting was about 250. Greetings were received from Arrhenius, Emil Fischer, Roscoe, Ramsay, Van't Hoff, Julius Thomsen, Lunge and von Baeyer. A paper on "Agglutination and Coagulation" was presented by Savante Arrhenius, of Nobel Institute, Stockholm, and two papers were presented by Emil Fischer, one on "Polypeptides" and one on "Micropolarization."

The following addresses were given before the general assembly:

A. L. Winton, "Official Inspection of Commodities."

Philip E. Browning, "The Increasing Importance of the Rarer Elements."

Wm. D. Richardson, "The Analyst, the Chemist and the Chemical Engineer."

Thos. B. Osborne, "Our Present Knowledge of Plant Proteins."

Frank K. Cameron, "Some Applications of Physical Chemistry."

W. A. Noyes, "Chemical Publications in America in Relation to Chemical Industry."

Wm. Walker, "The Electrolytic Corrosion of Iron as Applied to the Protection of Steam Boilers."

W. E. Whitney, "The Research Chemist."

Wm. McPherson, "A Discussion of Some of the Methods used in Determining the Structure of Organic Compounds."

The following papers were read before the sections:

AGRICULTURAL AND FOOD CHEMISTRY

A. L. WINTON, *Chairman*

The Determination of Cottonseed Hulls in Cottonseed Meal: G. S. FRAPS.

The method consist of boiling two grams of the material, after extraction with ether, with 200 c.c.

of fiftieth normal caustic soda. The residue is filtered off, dried, weighed, ignited and weighed again. Cottonseed meals of high purity may yield 10 per cent. residue; hulls give 75 per cent. The freedom of the meals from hulls is judged from the percentage of the residue.

The Production of Active Nitrogen in the Soil: G. S. FRAPS.

This is a brief statement of results, which will be published in full elsewhere. It is impossible to condense the article more, but the author sees promise of securing a method for determining the needs of the soil for active nitrogen.

The Estimation of Dry Substance by Refractometer in Liquid Saccharine Food Products: A. HUGH BRYAN.

The paper records results of comparative determinations of dry substance, by loss of weight at 70° in vacuum oven and from refractive index of the substance, using a table for transforming to dry substance. Samples of maple syrup, cane syrup, glucose, honey and cane and beet molasses were used, and results tabulated. In all the above substances except honey, the dry substance by refractometer agrees very closely with actual dry substance. Individual cases may show as high as two per cent. difference. With honeys the differences are larger, exceeding two per cent. in many cases. It is not certain whether the method for actual dry substance gives reliable results. For most liquid saccharine products the refractometer can be used for this determination and the results will be more nearly the actual dry substance than that derived from specific gravity.

The Determination of Sugar in Meats: A. LOWENSTEIN and W. P. DUNNE.

The purpose of the paper is to point out an error in the method for the determination of reducing sugar in meat, as outlined in the Official Methods of Analysis of the A. O. A. C. and in various government bulletins, to show the cause and magnitude of this error, and also the difficulties encountered in the manipulation of the method. A simple method is proposed which avoids the error referred to; avoids the use of lead acetate as a clarifying agent and permits of the determination of reducing sugars, succose and nitrates (saltpeter) in one portion of the sample. The method is rapid and accurate, its accuracy being indicated in several tables in the article.

Spanish Paprika: A. LOWENSTEIN and W. P. DUNNE.

This article furnishes data on the composition of a number of samples of pure Spanish paprika, of known origin and also on the ground commercial article imported from Spain. It points out the adulterants commonly employed and their means of detection, and particularly the detection of olive or other added oil. The presence of added oil is revealed by the determination of the iodine number and refractometer reading of the non-volatile ether extract, and also by the alcoholic extract, all of which are materially lowered by the addition of oil. It is convenient to make a tintometer reading of the alcoholic extract and thus record the color, the paprika usually being graded according to its color.

The Determination of Diastatic Power: A. W. MEYER and H. C. SHERMAN.

This was a preliminary notice of a somewhat extended investigation of the methods for the quantitative determination of the activity of amylases of different origin. The saccharification of soluble starch by taka-diastase and pancreatin has been studied. The work is still in progress and will be reported in detail later.

The Detection and Identification of Certain Reducing Sugars by Condensation with p-Brom-Benzyl-Hydrazide: E. C. KENDALL and H. C. SHERMAN.

Under the conditions which have been worked out this reaction affords a fairly delicate method for the detection and identification of glucose, galactose, mannose or arabinose.

The Composition of Known Samples of Paprika: R. E. DOOLITTLE and A. W. OGDEN.

As indicated by the title, this paper is a statement of the results obtained in the examination of a large number of paprikas obtained in the whole pods direct from producers. A method for detection of added oil by means of determination of iodine number of ether extract is given.

Gluten Feeds—Artificially Colored: EDWARD GUDEMAN.

The paper gives processes of the manufacture of gluten feeds, by-products in the corn starch, glucose and starch sugar industries. Methods for examinations of gluten feeds for added colors given. Examination of a large number of gluten feeds, sold in the United States (62 samples from agricultural experiment stations), showed over 75 per cent. to have been artificially colored with coal-tar colors. The author considers the artificial coloring of feed stuffs as contrary to the federal food act and many state food acts, unless such products are specifically labeled as artificially colored. The purpose of adding color to gluten feeds is only for deception, to make them appear better than they really are or to hide some inferiority, such as the use of rotten, burnt or fermented corn.

The Detection of Small Quantities of Turpentine in Lemon Oil: E. M. Chace.

The method is based upon the different forms shown by the nitroso chlorid crystals of pinene and limonene when examined under the microscope. The nitroso chlorids of the terpenes of the sample to be examined are prepared from the first 5 per cent. fractionally distilled by means of a Ladenburg 3-bulb flask or with a Glinsky fractionating column, the latter giving the better results. The crystals are purified by solution in chloroform and recrystallization from methyl alcohol. Olive oil is used for mounting.

The Manufacture of Lemon Oil in Sicily: E. M. Chace.

The location and a brief description of the principal centers of the production of lemon oil in Sicily were described. Three methods of production are used in the island. The two-piece method in which the lemon is cut in half, the pulp removed and the oil extracted by means of pressure within a sponge is used in the Messina, Etna and Syracuse districts. The three-piece method, in which the lemon is pared, the skin being removed in three pieces, leaving the pulp with a small portion of the skin adhering to each end, the parings being pressed against a flat sponge for extraction, is confined to the Barcelona and Palermo districts. The use of machines in the production of oil is confined to the province of Calabria upon the mainland, less than 5 per cent. of the total output being thus manufactured.

The Influence of Environment on the Composition of Wheat: J. A. LeClerc and Sherman Leavitt.

Crops grown from the same seed at three points of widely different climatic conditions, such as Kansas, California and Texas, forming a so-called triangular experiment, and similarly at South Dakota, California and Texas, showed a marked difference in the protein content, the weight per bushel, the percentage of starchy grain and total sugar content. Kansas produced invariably a high protein and California a low protein and high sugar content wheat. Wheat grown in California one year was found to double its protein content when grown in Kansas the next; the reverse was found to be true when Kansas seed was grown in California. These differences are due to climatic conditions. The composition of the seed seems to exert no influence on the composition of the crop.

The Analysis of Meat Extracts and other Meat Preparations: John Phillips Street.

Twenty-two paste extracts, 13 fluid extracts, 4 meat juices and 3 meat powders were very completely analyzed. The determinations made were water, alcohol, ash, fat, chlorin, phosphoric acid, potash, acidity to phenolphthalein and litmus, total nitrogen, insoluble and coagulable nitrogen, syntonin, ammonia, nitrogen precipitated by tannin-salt and by zinc sulphate, meat bases, creatinin, creatin and total purins. In general the extracts contained excessive amounts of added sodium chlorid, in one case over 25 per cent. The biuret reaction failed in the zinc sulphate filtrate in all the pastes, but as tannin-salt in every case precipitated much more nitrogen than zinc sulphate, on the average about 2 per cent., it is suggested that this difference may be largely due to Fischer's non-biuret-reacting polypeptides. Attention is called to the false and misleading claims made by many of the manufacturers for the extracts. The methods of analysis used are given in detail, and a bibliography of the subject from the analytical standpoint, with 221 titles, is appended.

Commercial Preservation of Flesh Foods: W. D. Richardson.

The means used at the present time for food preservation may be classified under four principal heads: (1) heat sterilization, (2) desiccation, (3) low temperatures, (4) the use of antiseptics. Any of these processes may be carried out in the absence of air or oxygen. All of these methods have been used by primitive man singly and in combination from times of greatest antiquity, and are used by primitive tribes to-day. Modern science has extended the means of carrying out the various methods of preservation, but has made only one original contribution to the art, namely, the use of small quantities of noncondimental antiseptics. Of the various methods of preservation the application of low temperatures would seem to be the best, inasmuch as little or no alteration in composition occurs under this application and at most there is a change in physical structure which does not affect composition or nutritive value.

Chemistry of Frozen Beef and Poultry: W. D. Richardson.

Analyses of fresh and frozen poultry and of fresh and frozen beef (in the latter case the cruror triceps was used on account of its leanness, size and uniformity of structure) were made at intervals for a period of one and a half years. The determinations were: moisture, ash, fat, ammoniacal nitrogen (by two specially devised methods), and on the cold-water extract, total solids, ash, organic solids, total nitrogen, coagulable nitrogen, albumose nitrogen, meat-base nitrogen and acidity calculated as lactic acid. From these determinations no alteration was discovered for the period mentioned in the composition of either beef or poultry. These results were borne out by practical cooking tests. The work will be continued for an indefinite period.

Histology of Frozen Beef and Poultry: W. D. RICHARDSON.

Histological examination of frozen beef and poultry for a period of one and a half years failed to detect any progressive alteration in the structure of the muscular tissues. The samples frozen for a short period of time, when properly thawed, appeared to have the same structure as those frozen for a longer period. When muscular tissues freeze, the water which begins to separate as ice at — 0.4° C. solidifies outside the muscle fibers, and by progressively accumulating between the fibers as it freezes, causes them to appear much smaller than normal and of irregular form. in fully frozen samples, temperatures below — 9° C., the ice areas are usually greater than the areas of muscle fiber, either in cross or longitudinal sections. On account of these ice areas it is impossible for bacteria to penetrate into frozen meats. From the laws of cryoscopy, the solution which remains after the freezing out of so much ice must be very concentrated, and it is altogether likely, from experiments already conducted, that microorganisms are unable to multiply or remain active in such a medium. On the other hand, it is probable that microorganisms if artificially inoculated into meats under these circumstances would certainly lose their vitality and die. Experiments on this point are not yet concluded. If frozen muscular tissue is thawed rapidly, the normal appearance is not resumed. On the other hand, if thawed sufficiently slowly, a histologic picture very close to the normal is obtained.

A Method for Detecting Synthetic Color in Butter: R. W. CORNELISON.

The clear fat is shaken with glacial acetic acid, and the acid, after being separated from the fat, is tested by the addition of a few drops of mineral acid, particularly nitric. A pink color developed in samples containing the several azo colors which were tried. The color of the acetic-acid extract is also noteworthy. Reactions of several vegetable colors also are given. The writer makes an earnest plea for the use of the true chemical names of colors in place of the fanciful and much-confused names in use in the trade.

The Composition of Milk from Dutch Belted Cows: HERMANN C. LYTHGOE.

The Dutch belted cattle are all jet black with the exception of a broad belt of pure white encircling the body. No white is admissible in the black, and the belt must be free from black. There are but few herds of this breed in this country, although single cows in mixed herds are not uncommon. There has been examined in the laboratory of food and drug inspection of the Massachusetts State Board of Health the milk of 23 registered, and of a few unregistered, Dutch belted cows. In general this milk is better than that produced by the Holsteins, being characterized by a much higher fat and refraction of the milk serum. The cows were milked in the presence of an inspector or analyst of the state board of health. The analyses of the twenty-five samples of milk reported may be summarized as follows:

Per Cent.	Total Solids
14	1 sample
13 –14	2 samples
12.5–13	3 samples
12 –12.5	8 samples
11.5–12	4 samples
11 –11.5	6 samples
10.93	1 sample

Per Cent.	Fat
Above 4	2 samples
3.5–4	11 samples
3 –3.5	12 samples

Per Cent.	Solids not Fat
9 –9.75	4 samples
8.5 –9	8 samples
8 –8.5	9 samples
7.73–8	4 samples

Studies on the Action of Heat on Milk: R. R. RENSHAW and J. C. WARE.

The following determinations were made every one fourth hour on milk heated at different temperatures between 60° and 85° C. for two and a half hours with and without varying amounts of formaldehyde: sugar, polarimetrically and gravimetrically, acidity, alkalinity, total nitrogen and total phosphorus on clarified filtrate. Lactose in a mixed citrate-phosphate solution having an alkalinity of 19° to lacmoid was not changed on heating to 85°. The authors conclude that the decrease in sugar is not due to caramelization, but to a greater bacterial activity throughout the first stages of the heating.

The Status of Silicon in Certain Plants: W. E. Tottingham.

Evidence has been secured which points strongly to the presence of organic silicon compounds in certain plants. Moist oxidation of 20 per cent. acetic acid and 95 per cent. alcohol extracts from green Gramineæ (mostly barley) has shown the presence of forms of silicon which are lost upon incinerating such extracts. Of the total silicon in the acetic-acid extract, 31.73 per cent. was lost in this manner. With the alcoholic extract 18.42 per cent. was lost in the same manner. The silicon in young fruiting fronds of *Equisetum arvense* was found to be 26.7 times more soluble in 95 per cent. alcohol than in distilled water. Evidence has been obtained of the existence of silicon as a constituent of volatile compounds in plants. The distillate by vacuum distillation of 95 per cent. alcohol extract of Gramineæ contained .0123 gram SiO_2. A current of air was passed over green fruiting fronds of *Equisetum arvense* while drying at 97° C., and then was drawn through an absorbing train. By oxidation, .0023 gram SiO_2 was recovered from the water condensation and .0039 gram from the conc. H_2SO_4 absorption. These data strongly suggest the occurrence of organic and volatile silicon compounds in plants. They further open the field for future study on the relation and importance of silicon in plant nutrition.

Abstracts have not been received for the following papers:

The Determination of Reducing Sugars: Fritz Zerban.

Determination of Volatile Fatty Acids: Edward Gudeman.

Effect of Heat upon Physical and Chemical Constants of Cottonseed Oil: Elton Fulmer.

The Determination of Total, Fixed and Volatile Acids in Wine: Julius Hortvet.

The Chemistry of Durum Wheat Flour: E. F. Ladd.

Water and Starch in Meat Products: Floyd W. Robison.

The Determination of Tin in Canned Apple Juice: H. C. Gore.

The Toxicity of Ferrous Sulphate and of Acids to Rye and Barley Seedlings: Burt L. Hartwell and F. R. Pember.

ORGANIC CHEMISTRY

Wm. McPherson, *Chairman*

The Anhydrides of Meta- and Para-phthalic Acids: John E. Bucher and W. Clifton Slade.

When meta-phthalic acid is dissolved in acetic anhydride and the excess of reagent distilled a viscous oil is obtained. On heating this in vacuo at 200° C., a solid residue of meta-phthalic anhydride is obtained. This substance is insoluble in dilute sodium carbonate but dissolves rapidly in sodium hydroxide solutions. Water converts into the corresponding acid very easily in the presence of solvents. The method of preparation and the properties of para-phthalic anhydride are similar to those of the meta compound.

The Formation of Naphthalene Derivatives from Phenylpropiolic Acid and its Substitution Products: John E. Bucher.

Phenylpropiolic acid heated with acetic anhydride gives a quantitative yield of 1-phenylnaphthalene-2, 3-dicarboxylic anhydride. This saturated compound on oxidation yields o-benzoylbenzoic acid, diphenyltetracarboxylic acid, 1-phenyl-phenyl-o-glyoxyltricarboxylic acid and probably benzenepentacarboxylic acid. The above polymerization has been shown to be a general reaction as piperonylpropialic, o-chlor-, m-chlor-, m-nitro-, p-chlor-, p-iodo-, p-nitro- and p-methoxy-, phenylpropiolic acids all yield saturated anhydrides and nearly all of these have already been shown to be derivatives of 1-phenylnaphthalene. A number of practical applications of this synthesis were pointed out.

Chemical Publications in America in Relation to Chemical Industry: W. A. Noyes.

The American Chemical Society is the only large chemical society in the world which attempts to provide adequately both for the needs of those who are engaged in the applications of chemistry to the industries and to chemical engineering and of those who are engaged in teaching and in the prosecution of researches which have no immediate practical bearing. The dues of the society were increased by only three dollars when the *Chemical Abstracts* was established, while it costs between five and six dollars per member. The expenditures of the society somewhat exceed its receipts, but the rapid growth in membership indicates that the policy which has been adopted will be permanently successful. The new *Journal of Industrial and Engineering Chemistry* is to be sent to all the members of the society. Only by uniting in the support of all the publications can we succeed in fulfilling the purpose of the society, which is to care adequately for the interests of all classes of chemists. The benefits of the society are extended freely to any one who is willing to pay the dues. This has not, however, caused the membership of the society to be non-professional. There are only a few members who are not actually engaged in chemical work.

Rearrangements in the Camphor Series: the Structure of Laurolene: W. A. Noyes and C. G. Derrick.

An attempt is being made to gain a better insight into the nature and cause of some of the puzzling rearrangements which occur so frequently among the derivatives of camphor. The oxidation of laurolene, C_8H_{14}, has given a diketone, $C_8H_{14}O_2$. It seems almost certain that this ketone must contain two groups of the structure CH_3CO. The melting point of its disemicarbazone indicates that it is not 2, 7-octanedione, which would be formed if laurolene were tetrahydro-ortho-xylene. The activity of laurolene also excludes that formula. The formula of Eykmann, according to which laurolene is 1, 2, 3-trimethylcyclopentene, is now the most probable.

Studies in Nitration, VI. Melting Points of Mixtures of Ortho- and Paranitraniline: J. Bishop Tingle and H. F. Rolker.

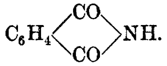
The authors have shown previously that the melting points of mixtures of o- and m- and of m- and p-nitranilines form regular curves, whereas the mixtures of o- and p-nitraniline melted at highly irregular temperatures. A fresh series of mixtures of these two isomers has been prepared with additional precautions to secure homogeneity and also constancy of composition. The m.p. of each mixture was determined, the material was allowed to solidify and it was then melted once more. The results have been plotted in the form of two curves which do not exhibit a very simple relationship and which are both highly irregular. Moreover, the melting points of mixtures of the o- and p-nitranilines are not nearly so sharp as those mixtures of the other isomers. Suggestions were made as to the possible cause of these phenomena which are probably due to polymorphism.

Action of Sodium on Certain Esters: J. Bishop Tingle and Ernest E. Gorsline.

According to Claisen's hypothesis, which was adopted subsequently by Nef, the formation of ethyl acetoacetate, $CH_3C(OH){:}CHCO_2C_2H_5$, from ethyl acetate, $CH_3CO_2C_2H_5$, depends upon the previous production of sodium ethylate, which is the active agent in producing the condensation. A. Michael, on the other hand, considers that sodium reacts directly with ethyl acetate, forming such a compound as $NaCH_2CO_2C_2H_5$ or $CH_2{:}C(ONa)\text{-}CO_2C_2H_5$. We have purified ethyl acetate with great care by a new method and find that the specimens obtained in this way react very readily with sodium, either alone or in the presence of ether. Experiments have been carried out on the interaction of sodium and certain esters. It is found that ethyl malonate, $H_2C(CO_2C_2H_5)$, ethyl chlormalonate, $Cl(CO_2C_2H_5)$, and ethyl dimethylmalonate, $(CH_3)_2C(CO_2C_2H_5)$, react with 2, 1 and 4 atomic proportions of sodium, respectively. Ethyl phthalate and the metal react, but an insoluble coating is formed over the surface of the wire so that the action quickly ceases. Our study of the catalytic effect of ether, pyridine and quinoline in promoting the Claisen reaction (acetoacetic ester condensation) has been extended. The results of our work support Michael's explanation of the reaction and show that the Claisen-Nef hypothesis is open to the gravest doubt.

Intramolecular Rearrangement in the Phthalamidic Acid Series: J. Bishop Tingle and H. F. Rolker.

In conjunction with Messrs. Cram and Lovelace, the senior author has shown previously that phthanilic acid, $C_6H_5NHCOC_6H_4CO_2H$, changes very readily in the presence of amines to phthalanil,



$$C_6H_4\left\langle\begin{matrix}CO\\CO\end{matrix}\right\rangle NH.$$

It was suggested that the change in the equation was preceded by the formation of a salt, $C_6HNHCOC_6H_4CO_2NH_3R$. This hypothesis has been confirmed by the preparation of several such salts, the stability of which is found to vary according to the nature of the amine and also to that of the group R in the parent acid $RNHC_6H_4CO_2H$. In addition to this reaction a second one occurs which consists in the replacement of the group R in the original acid by a different complex R′ derived from the amine thus, $RNHC_6H_4CO_2H + R'NH_2$, $R'NHC_6H_4CO_2 + RNH_2$. This new acid may then pass into the imide (anil). Finally there is evidence showing that occasionally some diamide, $C_6H_4(CONHR)_2$, may be formed. The reactions have been studied in detail with a considerable number of acids and amines, and the influence of various solvents and also the temperature effects have been determined.

A Wax Acid from Soils; Agroceric Acid: Oswald Schreiner and Edmund C. Shorey.

In the examination of a black clay loam from North Dakota there was obtained by treatment with boiling 95 per cent. alcohol a colored extract from which a micro-crystalline precipitate separated on cooling. By washing with cold alcohol and recrystallizing, this can be obtained free of color. On drying this purified precipitate and treating with cold ether it is divided into two portions. The ether soluble portion crystallizes on evaporation of the ether in minute leaflets, melting at 72–73° C. The physical and chemical properties of this body place it among the fatty acids found in waxes. Elementary analyses correspond with the formula $C_{21}H_{42}O_3$, the hypothetical acid of a lactone found in carnauba wax. The name agroceric acid is proposed for this body.

A Cholesterol Body in Soils; Agrosterol: Oswald Schreiner and Edmund C. Shorey.

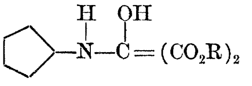
When the alcoholic extract of the soil referred to in the first paper is separated from the precipitate, which forms on cooling, and is evaporated to small volume, a resinous dark-colored mass is obtained. Cold ether dissolves a portion of this, including the coloring matter. Spontaneous evaporation of the ether leaves again a resinous dark-colored mass. Treatment of this with cold absolute alcohol removes the coloring matter and leaves a white crystalline residue. Purification of this by recrystallization yields a body crystallizing in plates resembling those of phytosterol, melts at 237° and gives the cholesterol reaction with acetic anhydride and sulphuric acid. Elementary analysis gave figures corresponding to the formula $C_{26}H_{44}O$. The name agrosterol is suggested for this compound.

Studies in Catalysis; Some Practical Results and their Application to the Synthesis of Some Esters: Isaac K. Phelps.

A study of the quantitative yields of various esters in a special form of apparatus under known conditions of temperature and in the presence of various substances as catalyzers. From the present evidence, it seems that each individual catalyzer has its own individual effect. Zinc chloride in the presence of alcohol and hydrochloric acid is the most efficient chloride studied; next in catalytic effect come stannic, cupric and mercuric chlorides, followed by bismuth and antimony chlorides. Potassium chloride appears inactive; the following chlorides act as negative catalyzers, sodium, lithium, ammonium, aluminum and calcium. The list for sulphates in order of efficiency is sulphuric acid, acid sodium sulphate, ammonium, potassium, aniline and pyridine acid sulphates. Zinc bromide and hydrobromic acid act less efficiently as ester-forming catalyzers as the temperature rises. In esterifying malonic acid, 96.1 per cent. yield was obtained: cyanacetic acid 97.1 per cent. of the theory; applying these results to the synthesis of malonic ester from chloracetic acid, it appears that conditions of quantitative reactions are found with a yield of 87 per cent. from chloracid of 95 per cent. purity; or in synthesizing similarly cyanacetic ester a yield of 85 per cent. from acid of the same purity.

Addition Reactions on Methyl Oxomalonate: Richard S. Curtiss and F. G. C. Spencer.

Methyl oxomalonate can only be made perfectly anhydrous by distilling methyl dihydroxymalonate with phosphoric anhydride. It gives with ammonia and its derivatives compounds more or less unstable, which represent the class of hypothetical intermediate addition products, supposed to be first formed when amines, etc., act on aldehyde or ketone groups, and which pass into the final stable end product by loss of the elements of water. Thus aniline gave



$$—\overset{\mathrm{H}}{\overset{|}{\mathrm{N}}}—\overset{\mathrm{OH}}{\overset{|}{\mathrm{C}}}=(\mathrm{CO_2R})_2$$

Urethone reacts in like manner. More positive ammonias add on two oxomalonate radicles. Alcohols and even the acids add on the carbonyl group of these esters. The products which are tartronic ester derivatives are unstable and readily dissociate into their constituent parts, in moist air or simply by heating. The studies on these and similar substances are being continued.

Methods for the Determination of Salicylates: Atherton Seidell.

In looking for a reaction upon which to base a quantitative method for the determination of the salicylic acid radicle, the author found that bromine acting upon a concentrated hydrochloric acid solution of salicylic acid yielded di-brom-salicylic acid (m. pt. 220°) and in the presence of relatively small amounts of H_2O and at 80–90° the reaction proceeded quantitatively, although rather slowly. The suggested method is as follows: The weighed sample of 2–3 grams of salicylate is dissolved in 100 c.c. of water. 3–5 c.c. portions of this solution measured accurately from a burette are mixed with 10–20 times the volume of concentrated hydrochloric acid in a glass-stoppered bottle. Standard 0.2 normal potassium bromate solution is run in slowly until a persistent pale yellow color remains, the solution then warmed and shaken until the color disappears, more bromate then added, and the color discharged by further heating and shaking; this alternate adding of bromate and heating continued until the temperature has reached 80–90° and the pale yellow color produced by two to three drops of the bromate remains at least fifteen minutes. Four atoms of bromine per one molecule of salicylic acid are used. The reaction is slow and patience is required, but with care satisfactory results may be obtained.

Abstracts of the following papers have not been received:

On Certain Derivatives of Tetrachlororthoquinone: C. Loring Jackson and H. A. Flint.

On the Reactions of Tautomeric Acids and their Salts with Diazoalkyliden and with Alkyl Halides: S. F. Acree.

On Furoyl Acetic Ester and its Pyrazotone Derivatives: Henry A. Torrey and J. E. Zanetti.

On Rosocyanine: C. Loring Jackson and Latham Clarke.

The Nitration of p-Tolylglutaric Acid: S. Avery.

The Action of Phosphorus Trichloride on Organic Acids: Wm. McPherson and Howard J. Lucas.

Comparison of Isomeric—N:C(OR) *and* NR:CO—*Compounds in the Quinazoline Group:* M. T. Bogert and C. E. May.

4, 6-Diamino Isophthalic Acid and Some of its Derivatives: M. T. Bogert and Alfred H. Kropff.

3-Amino Phthalic Acid and Some of its Derivatives: M. T. Bogert and F. L. Jouard.

The Colored Salts of Schiff's Bases: F. J. Moore.

The Oxidation and the Reduction of b-g-Diphenyl-g-Cyanbutyric Acid: S. Avery.

An Insoluble Congo Red; a White Derivative of Congo Red: Irving W. Fay.

On an Oxidation Product of Tetrabromorthoquinone: C. Loring Jackson and H. A. Flint.

INDUSTRIAL CHEMISTRY

W. D. Richardson, *Chairman*

The Cleaning of Blast Furnace Gas: G. D. Chamberlain.

A review of methods of cleaning and present tendencies and practise. The cleaning divided into two phases. (1) A preliminary scrubbing either dry or wet, or a combination of the two, for fuel purposes—hot blast stoves and boilers. (2) Fine washing for gas-engine use. The raw gas carrying from 1 to 5 grams of dust per cubic foot is cleaned down to .1 to .5 for fuel and to .005 gram per cubic foot or less in fine gas for engine use. The magnitude of the problem is suggested in the fact that approximately six tons of gas are incidentally produced for each ton of pig-iron made.

Determination of Nickel and Chromium in Steel: E. D. Cambell.

The object of this research was to modify the cyanide-iodide method for the determination of nickel, in such a way that a satisfactory titration could be made in the presence of iron. The titration of nickel with potassium cyanide, using silver iodide as indicator, was proposed by the author in 1895, but in the original method the nickel was separated from the iron before titrating. In the new method the iron is kept in solution as double pyrophosphate by means of sodium pyrophosphate, copper when present is avoided by dissolving in dilute sulphuric acid. Chromium is determined in the same sample as that used for the nickel by a slight modification of the Galbraith method.

Application of Ericsson's Lead Method to the Analysis of Spelter, Zinc and Lead Ores: Eric John Ericsson.

The method was described in the September issue, 1904, of the *Journal of the American Chemical Society.* The lead is brought into solution as nitrate, ammonia and ammonium persulphate added in excess and boiled. The resulting lead peroxide is filtered off, washed. Filter with precipitate are thrown back into beaker in which precipitation was made, excess of acidulated hydrogen peroxide added and stirred until the lead peroxide is dissolved, the excess of hydrogen peroxide is measured by standard potassium permanganate of such strength that each tenth of a cubic centimeter = 0.01 per cent. lead when 1.92 grams are taken as in low-grade ores and the determination of lead in zinc ores. In the case of spelter 19.2 gram sample are taken when each tenth of the potassium permanganate solution = 0.001 per cent. lead. It is believed the new method will fill a long-felt want, since we have not heretofore had a reliable method for low-grade ores. It will be found on investigation to be a marvel of accuracy.

The Crystallization of Soap: W. D. Richardson.

When crystals form in transparent soap they usually first appear as bundles of two or three long slender needles pointed in opposite directions from a central nucleus. Later more needles appear until the crystal looks something like two whisk-brooms with the handles together. The nucleus does not appear to grow larger with age, but more needles form from the center until a circular disk of radiating needles is formed and this may increase in size indefinitely. Sometimes only one or two crystals will form in a bar of soap, at other times they will form in such numbers that the whole bar of soap becomes opaque and at a little distance can not be distinguished from a piece of opaque cold-made soap. In cold-made soap the same crystal-form is observed, with radiating needles starting from nuclei of fibrous structure which occupy the spaces originally occupied by fat globules in the emulsion of fat and alkali solution. It is suggested that in old bars of ordinary curd soap the same structure may be found, although it is difficult to observe microscopically. The composition of the nuclei has not been determined.

Glue Standards and Methods for Determining their Viscosity and Jelly Strength: Jerome Alexander.

Although the viscosity and jelly strength of glues and gelatines are the most important test figures, no standard methods have been agreed upon for their determination. It is proposed to establish as standards the methods described by the author in *J. S. C. I.*, Vol. 25, p. 158, which in brief are as follows: To determine—*Viscosity.* A glass pipette of convenient size and construction, which delivers 45 c.c. of water at 80° C. in fifteen seconds. Exact measurements and instructions for making the pipette are given. *Jelly Strength.* The jelly tester described, by which is determined the weight required to effect a certain compression of an unsupported block of jelly of definite size, composition and temperature (see also U. S. Patent No. 882,731). Sixteen uniformly graduated grades of glue were selected as standards, which include not only the so-called "Cooper grades," but also all other grades of glues and gelatines. The standards vary *per grade* under the conditions given, about one second in viscosity, and about 622 grams (22 oz.) in jelly strength.

Abstracts have not been received for the following papers:

Gas Producer Practise: George C. Stone.

The Influence of Fine Grinding on the Ferrous-Iron and Water Content of Minerals: W. F. Hillebrand.

The Stability of Rosin at Slightly Elevated Temperatures: C. H. Herty and W. S. Dickson.

A Rapid Method for the Determination of Oil in Cottonseed Products: C. H. Herty and M. Orr.

The Effect of Leaching Alcoholic Distillates through Wood Charcoal: Wm. L. Dudley.

The Mercerizing Process: J. M. Matthews.

Coal Modifications, Natural and Artificial: S. W. Parr.

Modifications of Illinois Coal by Low Temperature Distillation: S. W. Parr and C. K. Francis.

An Initial Coal Substance having a Constant Thermal Value: S. W. Parr and W. F. Wheeler.

Reactions in Water Softening: Edward Bartow.

The Relation between Teachers of Chemistry and the Chemical Industries: B. B. Freud.

Note on the Determination of Unsaponifiable Matter in Oils and Fats: A. G. Stillwell.

A Method for Preparing a Standard Alkaline Solution: David Wilbur Horn.

The Nature of the Volatile Matter of Coal as Evolved under Different Conditions: Horace C. Porter and F. K. Ovitz.

Refining and Testing Wood Turpentine: F. P. Veitch and M. G. Donk.

The Determination of Vanadium, Molybdenum, Chromium and Nickel in Steel: Andrew A. Blair.

Selective Economy in Raw Materials: H. F. Mork.

The Basis of Quality in Paper: A. D. Little.

The Calorific Power of Petroleum Oils and the Relation of Density to Calorific Power: H. C. Sherman and A. H. Kropff.

A Comparison of the Calculated and Determined Viscosity, Flash and Fire Tests in Oil Mixtures: H. C. Sherman, T. T. Gray and H. A. Hammerschlag.

Paint Analysis: Percy H. Walker.

A Microscopic Investigation of Broken Steel Rails: Henry Fay.

Industrial Chemistry as Taught at Pratt Institute: Allen Rogers.

B. E. Curry,
Secretary

(To be continued)