

of the Brown Leghorn pepper-and-salt pattern. The F_1 brown females are yellower on the fore part of the back and wings than are the Brown Leghorns. They seem to resemble some of Goodale's F_1 brown females, but none are as dark as some of his. Perhaps such would have appeared if a larger number had been raised.

These results show that the gray pattern behaves as the barred and brown ones have already been shown to do. The results may be explained as the others are. Represent the gray factor by G, the brown by B, and femaleness by F. Assume that both G and B are spurious allelomorphs to F.²

The representation will be

Brown Leghorn ♂ — gBf gBf	}	produce {	gBf Gf — gray ♂.
Columbian Wyandotte ♀ — Gf gF			gBf gF — brown ♀.
Columbian Wyandotte ♂ — Gf Gf	}	produce {	Gf gBf — gray ♂.
Brown Leghorn ♀ — gBf gbF			Gf gbF — gray ♀.

Nothing has yet appeared to show the composition of the Columbian Wyandotte with regard to B.

Several years ago a Columbian Wyandotte male was mated to a female of the Silver Laced Wyandotte breed, which has black wherever the Columbian has it and also has the feathers of the back, breast and shoulders white, edged or laced with black. The F_1 birds were nearly typical Columbians, one of the males being near enough to that color to win a prize as a Columbian at a poultry show. Some of the females, however, showed black edging on the tips of some of the feathers of the back. One of these was mated to a Columbian Wyandotte male, and the result was practically the same as in the F_1 generation. Unfortunately, this cross was not made in the right direction to bring out the sex-limited character, but the result agrees well with that described above.

A. H. STURTEVANT

COLUMBIA UNIVERSITY,
January 2, 1911

² Goodale's work (mentioned above) has shown that B is sex-limited.

THE AMERICAN ASSOCIATION FOR THE
ADVANCEMENT OF SCIENCE
THE FORTY-THIRD GENERAL MEETING OF
THE AMERICAN CHEMICAL SOCIETY
AND SECTION C

THE forty-third general meeting of the American Chemical Society and Section C of the American Association for the Advancement of Science was held at Minneapolis in the Chemistry Building at the University of Minnesota, December 28–31, 1910. The first general meeting was called on Wednesday morning.

About 300 members and guests registered for the meeting. Approximately 275 of these were members of the society. The meeting was a thoroughly good one from the consideration of attendance, number and quality of papers, and the generally good time which every one enjoyed because of the generous hospitality of our hosts.

The council of the society met on Wednesday afternoon and Thursday evening, when the general business and election of officers were considered.

Wednesday evening the Minneapolis Section of the society extended a complimentary smoker to the visitors at the Commercial Club. Complimentary luncheons were also prepared for the visitors during each day of the session.

On Thursday and Friday afternoons excursions were made to the Minneapolis flour mills, International Stock Food Factory, St. Anthony Falls Power Company, the linseed oil and paint companies. On Saturday afternoon the visitors enjoyed a free excursion to the many points of interest about Minneapolis and St. Paul.

The following papers and addresses were given before the general meetings:

"A Universal Law," President W. D. Bancroft.

"Report for the International Committee on Atomic Weights," F. W. Clarke.

"The Lost Arts of Chemistry," W. D. Richardson.

"The Basis of Industrial Efficiency," Arthur D. Little.

"Synthetic Metals from Non-metallic Elements," Herbert N. McCoy.

"Progress in Food Chemistry," H. E. Barnard.

"Mechanism of Cell Activity," Carl L. Alsberg.

"Waste Wood and some of its By-products," Geo. B. Frankforter.

"The Formation of Carbohydrates in the Vegetable Kingdom," Wm. McPherson.

"The Efficiency of the College Graduate in the Chemical Industry," Chas. F. Burgess.

BIOLOGICAL SECTION

Carl L. Alsberg, *chairman*

I. K. Phelps, *secretary*

The Lecithin Content of Milk under Pathologic Conditions: L. W. FETZER.

The results show that milk obtained from animals suffering from mastitis contains less lecithin than the milk obtained from healthy animals. It was further noted that where a diminution in the lecithin content took place there was a corresponding decrease in the fat content.

The Antitoxic Action of Certain Nutrient and Non-nutrient Mineral Bases with Respect to Plants: M. M. McCool.

Extensive data were presented with reference to antagonistic action of different bases with respect to plants. In the experiments reported the Canada field pea has been made the indicator, and a complete comparative study has been made of the growth of tops and roots in solutions of the different bases as follows: (1) solutions containing single bases in concentrations varying from those which are non-toxic to those which practically prohibit growth; (2) solutions containing two bases at concentrations including those toxic when employed alone.

It was found that mutual antagonism occurs in the following combinations:

Ca vs. Ba	Ca vs. NH_3
Ca vs. Fe	Ca vs. Sr
Ca vs. K	K vs. Sr
Ca vs. Mg	Na vs. K
Ca vs. Mn	Na vs. Mn
Ca vs. Na	Na vs. Sr

To express the above in terms of single antagonism, it is obvious that the second term in each of these systems could be placed first, but the arrangement given indicates that the base first given is the most important term in the combination with respect to antagonistic action.

The toxicity of the various bases in distilled water, full nutrient solutions, and soil cultures have been determined likewise as additional controls upon the preceding results. The tests of all of these bases in dilute nutrient solutions of any type, or in soil or sand cultures, diminishes or prevents the injurious action of the concentrations toxic in water.

The Oxidative and Catalytic Powers of Soils and Subsoils: M. X. SULLIVAN and F. R. REID.

Surface soils have the power to oxidize easily oxidizable substances such as aloin, guaiac, pyrogallol, hydroquinone, etc. When ten grains of soil are shaken with 50 c.c. of a 0.1 per cent. water solution of aloin, the yellow color of the aloin is changed to cherry red. On allowing the soil to settle, the solution can be filtered and the depth of color determined in the colorimeter. Broadly speaking, the oxidative power of the soil is symptomatic of a good soil condition, since soils of good productivity have in general good oxidizing power, while soils of poor productivity have, as a rule, poor oxidizing power. Subsoils have little, if any, action on aloin, though occasionally the oxidizing power of the subsoil may be as great or greater than the corresponding surface soil. The catalytic power of the soil or its capacity for decomposing hydrogen peroxide with the liberation of free oxygen is roughly parallel to the oxidative power in that soils known to be of good productivity have strong catalytic power, while poor soils have weak catalytic power. As compared with surface soils, the subsoils have, for the most part, a weak catalytic power. The oxidative and catalytic powers of the soil are analogous to these powers in plants and animals and are modified in much the same way.

Enzymotic Activities in Soils: OSWALD SCHREINER and M. X. SULLIVAN.

Within the bodies of microorganisms in plant roots and plant debris, in worms and animalcules, enzymes of various kinds must exist. Evidence of various enzymotic activities, proteolytic, amylolytic, inverting, cytolytic, lipolytic, etc., may be seen in many soils. Starches, sugars, cellulose, fat and protein are speedily changed or disappear, and in many cases, especially of proteins, some of the products of digestion may be found in the soil. The oxidizing and catalytic activities of the soil, comparable to the same activities in plants and animals where it has been attributed to enzymes, is especially noticeable and easy of demonstration. As yet no satisfactory means have been obtained of extracting enzymes from soil to any great extent, though in soils recently cropped there is some slight evidence of the presence of enzyme-like substances in the glycerine extract of the soil.

Soil Organic Matter as Material for Biochemical Investigation: OSWALD SCHREINER and EDMUND C. SHOREY.

Attention is called to the complexity of the organic matter of soils and the fruitful field of research that it offers for biochemical investiga-

tion. The importance of the chemical character of the organic matter of the soil is considered under four heads: its effect on crops; its effect on the bacteria and fungi of the soil; its influence on the physical properties of the soil, and its relation chemically to the mineral ingredients of the soil. By the application of the biochemical methods there have been isolated in this research twenty definite organic compounds thus far from that portion of soil organic matter included in the term humus. A chart showing the classification of these compounds, as well as methods of separation, was shown. The compounds comprised paraffin hydrocarbons, acids, alcohols, esters, carbohydrates, hexone bases, pyrimidine derivatives and purine bases.

The Isolation of Creatinine from Soils: EDMUND C. SHOREY.

Creatinine has been isolated from several soils by the following method. An extract made by shaking the soil for half an hour with 2 per cent. sodium hydroxide was neutralized with acetic acid and filtered. To the filtrate a small quantity of dextrose was added, heated to boiling, and Fehling's solution added until the precipitate formed was red in color. The precipitate after washing was decomposed with hydrogen sulphide and the filtrate from the copper sulphide concentrated under reduced pressure. Creatinine, if present in the soil, is in this filtrate together with purine bases and can be separated as creatinine zinc chloride and creatinine prepared from this by treatment with lead hydroxide. The creatinine was identified by the characteristic crystalline appearance of the zinc chloride compound and by the Jaffe, Weyl and Salkowski color reactions.

The Toxic Action of Organic Compounds as Modified by Fertilizer Salts: OSWALD SCHREINER and J. J. SKINNER.

The action of fertilizer salts in restraining the harmful influence of certain organic compounds was studied, as well as the effect of the compounds on absorption. The culture solutions comprised all possible ratios of the three principal fertilizer elements: phosphate, nitrate and potassium, varying in 10 per cent. stages.

The various fertilizer salts acted differently in overcoming the respective harmful effects of the toxic compounds. The mainly phosphatic fertilizers were the most efficient in overcoming the cumarin effects; the mainly nitrogenous fertilizers in overcoming the vanillin effects; the mainly potassic in overcoming the quinone effects.

The cumarin depressed potash and nitrate removal from nutrient solution more than phosphate; the quinone, on the other hand, depressed phosphate and nitrate more than potash; the effect of vanillin was not determined in this regard. It is interesting to mention that dihydroxystearic acid, which, as previously reported, appears to act much as vanillin did, depressed phosphate and potash more than nitrate. In this respect again the influence of the various harmful substances was different.

The conclusion is drawn that different toxic substances produce definite effects in their action on plants and that the effects are modified differently by the different fertilizer salts.

On the Catalase Content of Tissues and Organs after Prolonged Fasting: P. B. HAWK, Laboratory of Physiological Chemistry, University of Illinois.

The study embraced the examination of the tissues and organs of four dogs which were subjected to periods of fasting ranging from 7 to 104 days. A pup one month old was subjected to a 7-day fast, a dog from one to two years old served as the subject of the 30-day fast, whereas the longer fasts were carried out upon mature animals. The dogs were fed a constant water ration, the water being introduced by means of a stomach tube.

At the termination of the fasting periods chloroform-water extracts of the tissues and organs were prepared and their catalase values determined. The tissues and organs of normally nourished dogs were subjected to a similar examination in order to secure data for comparative purposes.

The catalase values of the fasting tissues and organs are much lower, in every instance, than those of the normal tissues and organs. It was also observed that the order of the tissues when arranged according to their catalase content is distinctly altered in the fasting animals from the order in force under normal conditions. There is apparently no uniformity as to the specific alterations which take place in the catalase content of animal tissues and organs under the influence of fasting. The data obtained from the four fasting animals under consideration are in every case different from normal catalase values, but at the same time these catalase values obtained from fasting animals exhibit marked variations when we make a comparison of the data from the four animals under investigation. It is of particular

Catalase Values

Dog	Tissue								Days
	Liver	Kidney	Spleen	Lung	Heart	Muscle	Brain	Pancreas	
Normal	67.1	66.4	8.8	7.2	4.3	2.7	0.8	0.7	104
Fasting	52.7	50.4	5.1	10.8	2.6	0.0	8.2	0.5	
Fasting	23.8	4.4	0.0	8.2	0.0	0.0	0.0	0.0	
Fasting	34.8	46.5	0.0	0.5	0.0	0.0	0.0	0.0	
Fasting	57.0	11.1	...	1.2	12.3	0.0	0.0	0.0	
Relative Order of Tissue									
Normal	Liver	Kidney	Spleen	Lung	Heart	Muscle	Brain	Pancreas	104
Fasting	Liver	Kidney	Lung	Brain	Spleen	Heart	Pancreas		
Fasting	Liver	Lung	Kidney						
Fasting	Kidney	Liver	Lung						
Fasting	Liver	Heart	Kidney	Lung					

interest that the tissues and organs of the dog which was subjected to the most prolonged period of fasting exhibit less alteration from the normal than do the tissues and organs of those animals which were subjected to much shorter fasts.

Demethylation in the Body: WILLIAM SALANT and I. K. PHELPS.

Determinations of the urinary purins precipitable by copper sulphate in sodium bisulphide after the administration of caffeine indicate that individuals of the same species vary considerably in their power to demethylate this substance. The amounts of purin nitrogen obtained from the urine of two dogs when a total of four hundred milligrams caffeine per kilo were given in eight days were eight and thirty-two milligrams purin nitrogen per kg. After feeding three hundred milligrams caffeine per kilo to these animals during the next four days eight and twenty-two milligrams purin nitrogen per kilo were obtained. After an interval of eight days the administration of caffeine was resumed and much greater amounts of purin were found in the urine. In one case the amount of purin per kilo was increased two hundred per cent., although the amount of caffeine given was only twenty per cent. greater. In the other dog the increase of purin nitrogen was sixty per cent. greater; the amount of caffeine in this case was likewise increased by twenty per cent. It was further observed that demethylation remained relatively unchanged when the caffeine was given daily.

Some Experiments on the Influence of the Digestive Process on the Excretion of Carbon Dioxide: G. O. HIGLEY.

The apparatus used in this work was the balance-chemograph.

The food employed was one half a pound of broiled beef-steak at each meal. The four subjects were students in the University of Michigan. No food was taken by the subject during the five hours preceding an experiment. The subject reclined for fifteen minutes, then the "normal" was determined. The food was now eaten and fifteen minutes thereafter, and at regular intervals, determinations of the carbon dioxide excretion were made.

The maximum increase over the normal was twenty-five per cent. in one case and only 7.7 per cent. in another case.

The promptness of the increase was also quite different, the increase over the normal being at the end of thirty minutes, 1.2 per cent., 7 per cent. and 11.9 per cent., respectively, in the case of three subjects.

The Incompatibility of Alcohol with other Nutrients: J. E. SIEBEL, JR., M.D.

The incompatibility as subject of this paper refers to a certain incompatibility with nutrients, especially in persons constitutionally affected, which is due to the fact that the human system, having a choice, disposes first of alcohol before other nutrients are affected in metabolism, as proved by the classic feeding experiments of Atwater and confirmed by the author's researches on the electromotive force of nutrients showing a maximum result for alcohol.

Accordingly and supported by professional experience, it is concluded that for people constitutionally afflicted with disorders in which, as in arthritis and glycosuria, excesses of proteids and saccharine food are to be avoided, such excesses

are especially harmful in connection with the use of alcoholic beverages, unless special rules of nutrition, given by the author, are followed.

Improvements in the Exact Determination of Nitrogen in Feces: ISAAC KING PHELPS.

The difficulties of an exact aliquot and of loss of nitrogen in drying the viscous material are met by each of two procedures:

The first procedure consists in dehydrating the moist mass by treatment with acidified alcohol and ether and filtration. The dry residue is then sifted and the nitrogen determined in the residual material, consisting of undigested material, in the powder obtained by sifting (which represents the residue from food) and in the alcohol-ether extract.

The second procedure consists in partially decomposing the moist material with concentrated sulphuric acid by heating in a steam bath until a homogeneous mass is produced. This is then aliquoted and the nitrogen determined in the aliquot.

The test of accuracy and adaptability of these procedures shows that they are both excellent.

The Excretion of Chlorides under the Influence of Copious Water-drinking between Meals: S. A. RULON, JR., and P. B. HAWK.

Three experiments were made on the influence of copious water-drinking between meals upon the excretion of chlorides. The subjects were young men ranging in age from 22 to 29 years. Each experiment was divided into three periods, a *preliminary* period during which nitrogen equilibrium was attained through the feeding of a uniform ration of low water content, a *water* period during which the uniform ration was supplemented by the drinking of large volumes of water *between meals*, and a *final* period in which the conditions of the preliminary period were in force.

In two of the experiments there was a pronounced increase in the output of chlorides upon the days of added water intake, with a return to normal during the final period. This augmented excretion of chlorides is interpreted as indicating that the large volume of water ingested during this period has markedly stimulated the secretion of gastric juice. The excess hydrochloric acid thus passed into the intestine has been reabsorbed and appears in the urine as ammonium chloride. The main bulk of the increase in the chloride excretion we believe to have originated in this way.

In one experiment there was a small increase in

the chloride output upon each of the days of increased water ingestion, followed by a pronounced rise in the output upon the first day following the water period. Neither the flushing properties of the water nor its stimulatory efficiency as regards protein catabolism or gastric secretion offers a satisfactory explanation for the high chloride concentration observed upon the day following the period of copious water drinking.

If we attempt to account for the increased output of chlorides noted during the period of copious water ingestion upon the theory that this increase originated through a stimulated catabolism of protein matter within the organism, we find it possible to account for only two per cent. or less of the chloride increase on this basis.

In every instance in which a portion of the urine of each day of the water period was collected in four sub-periods three and one half hours in length it was observed that the maximum chloride output and urine volume occurred during the second period of the day, *i. e.*, from 11:30 A.M. to 3 P.M. It was also observed that the highest percentage of ingested fluid (84 per cent.) was excreted during the periods of copious water intake.

Resorption of Fat: P. F. TROWBRIDGE, University of Missouri.

A group of seven calves six months old were selected as being of same breed and uniform in size and condition. They were fed several months until all were judged to be well fattened and all in about the same condition. The one thought to be the least fat was slaughtered and analyzed as a check animal. Two of the remaining were held at maintenance of body weight; two were fed so as to lose one half pound per day, and the other two were fed to gain one half pound per day. All were given the same feed, varying only in quantity. One of each group was slaughtered and analyzed at the end of six months, the other sub-maintenance animal at the end of eleven months and the other maintenance animal at the end of twelve months. The supermaintenance animal was not slaughtered, as the one half pound per day gain at his age—two years—was sufficient to make him improve in condition.

All the maintenance and submaintenance animals lost in fat. The long-maintenance animal gained in total protein and also in flesh protein. All the animals gained in weight of skeleton from 9.5 per cent. to 16.6 per cent. The skeleton of all animals gained in protein, moisture and

ash, and in fat except in that of the long sub-maintenance animal, which lost over 75 per cent. of its original fat. The animal on long sub-maintenance (eleven months) became greatly emaciated and the analysis showed that he had used up nearly all of his reserve store of fat, not only from his flesh, but from his skeleton. The short-submaintenance animal (six months) and the long-maintenance animal (twelve months) had used up nearly all the reserve fat of the tissues, but had not drawn upon the supply in the skeleton.

The loss in moisture is not sufficient to correspond to the loss in protein for a lean meat or connective tissue, which supports the view that in certain stages, at least, of fat resorption the fat is in whole or in part replaced by water.

The normal skeleton contains about 36 per cent. moisture. In the long-submaintenance animal it has risen to 53 per cent., while the fat content of the skeleton has dropped from 16 per cent. to 3 per cent. In this time the skeleton has gained nearly one per cent. of its total weight in dry protein. The long-submaintenance animal lost 10,627 grams in dry protein, but only 24,868 grams in moisture, which lacks about 16,000 grams of being enough to make up the protein loss to lean flesh and connective tissue. During this time the loss in fat was 43,829 grams, or about 90 per cent. of the total fat present at the beginning.

The Preparation and Properties of an Oxidase occurring in Fruits: FIRMAN THOMPSON and HARRY P. BASSETT.

An oxidase was prepared from the juice of pears and was found to have a marked action in the production of a tannin-like substance from gallic acid. The extent and rate of this action were measured by the precipitation of the nitrogen in a solution of egg-white. By this means a very extensive and rapid action of the enzyme was shown. Tannin determinations made by one of the standard methods also confirmed these results. It was further shown by means of plate cultures that the body thus produced exhibited marked germicidal properties.

A gradual decrease of soluble nitrogen in the juices prepared from various fruits indicates that a similar action takes place there on exposure to oxygen of the air. The writers consider it doubtful if tannin exists as such in the normal growing fruit, believing it to be rapidly formed on injury or removal from the tree, its function being to inhibit fungous or bacterial growths.

Abstracts for the following papers have not been received:

"The Iodine Content of a Physiologically Active Substance obtained from the Large, Medium, Small and Mixed Thyroid Glands of Beef, Hogs and Sheep," T. B. ALDRICH.

"The Processing of Japanese Persimmons," H. C. Gore.

"Studies on Lipoid Potassium Compounds of the Tissues," W. Koch and C. C. Todd.

"'Normal' Arsenic in the Human Body," R. L. Emerson.

"The Non-existence of so-called 'Normal Arsenic' in the Human Thyroid Gland," Wm. H. Warren.

"Nutrition Investigations, No. 30—Further Improvements in the Methods of Analyzing Flesh," A. D. Emmett and W. E. Joseph.

"A Method for the Estimation of Reducing Sugars," S. R. Benedict.

"On Luciferesceine, the Fluorescent Material Present in Certain Luminous Insects" (preliminary), F. Alex. McDermott.

"A Note on Fat Synthesis in the Human Intestine," H. M. Adler.

"On the Neutrality Equilibrium in Blood and Protoplasm. The Regulatory Activity of the Kidney," L. J. Henderson.

"Chloroform Narcosis and Fatty Degeneration in the Hearts of Nephrectomized Rabbits," F. H. McCrudden (with Paul A. Lewis).

"Further Studies on the Growth of Plants in Bacterial Transformation Products," A. Dachnowski.

"The Relation of Certain Odorous Constituents of Plants to Plant Metabolism," Frank Rabak.

"The Influence of Shade on Sugar Accumulation in Tobacco in the Tropics," H. H. Hasselbring.

"The Chromogen of the Hawaiian Bitter Yam," H. H. Bartlett.

"A Quantitative Method for the Estimation of Oxidases," H. H. Bunzel.

"The Alkaloid Content of Ergot and its Fluid Extract," A. Seidell.

"The Poisonous Properties of the Mushroom *Inocybe infida*," E. D. Clark.

"One Role of Carbonic Acid in Fermentation," C. H. Hudson.

"Studies upon the Biochemistry of Penicillium," O. F. Black.

"The Action of the Fungus *Diplodia* upon some Phosphorous Compounds of Maize," A. S. Reed.

"The Fermentation of Citric Acid in Milk," A. W. Bosworth and M. J. Prucha.

"Studies on Thermal Death-points of Milk Enzymes," W. N. Berg.

"Studies upon the Extractives of the Maize Embryo," C. L. Alsberg.

"A Rapid Method for the Production of Immune Sera," J. P. Atkinson.

"Plants which Require Sodium," W. F. V. Asterhout.

"Inosinic Acid," P. A. Levene and W. A. Jacobs.

"Yeast Nucleic Acid," P. A. Levene and W. A. Jacobs.

"The Distribution of Nucleariases in Animal Tissues," P. A. Levene and F. Medigrecean.

Dissolved Oxygen as an Index of Pollution: GEO. A. SOPER and PAYNE B. PARSONS.

The determination of dissolved oxygen as an index of sewage pollution has been found to be reliable in the work of the Metropolitan Sewerage Commission of New York, where the quantities of sewage and conditions attending the discharge of sewage were determined and other factors in the problem known.

Opinions differ as to the permissible limit of exhaustion of oxygen by sewage. Some authorities consider that more than 30 per cent. should not be taken from the water. Others have expressed the opinion that 70 per cent. was a permissible draft. To the present authors it appears that no arbitrary standard can safely be established. A careful consideration of the local conditions should determine the safe limit for any case.

Abstracts for the following papers have not been received:

"Chemical Study of Wheat—Part 2," G. B. Frankforter and Ben Hur Kepner.

"The Composition of some so-called Malt-tonics," Julius Hortvet.

"The Examination of Beverages for Caffeine and other Alkaloids," Edwin DeBarr.

"The Soluble Carbohydrates in Asparagus Roots," Fred W. Morse.

"The Examination of some California Alfalfa," M. E. Jaffa.

"Sagar By-products," Herbert M. Shilstone.

"Coffee and Coffee Substitute Extracts," Floyd M. Robinson.

"The Relative Toxicity of Substances added to and occurring Naturally in Foods," A. N. Cook.

"Quantitative Method for Determining Non-volatile Oil in Cereals," E. H. Harding and Miss Lilian Nye.

DIVISION OF AGRICULTURAL AND FOOD CHEMISTRY

H. E. Barnard, *chairman*

B. E. Curry, *secretary*

Preliminary Report on the Loss of Lime in some Drainage Waters: A. W. BLAIR and S. E. COLLISON.

The paper describes soil investigations involving the use of fertilizers in citrus culture in progress at the Florida Agricultural Experiment Station. A description of the large galvanized iron soil tanks in use is given and rainfall records and amount of drainage water collected from the tanks for a period of three months are reported.

The lime content of seven samplings of water for the three months is given in parts per million of water, and as pounds of calcium carbonate per acre.

Some Poisons in Foods: H. E. BARNARD.

A general discussion of the various poisons found in foods as preservatives and as they occur in nature.

Determination of Dissolved Oxygen in Water: GEO. A. SOPER and PAYNE B. PARSONS.

This paper reports an accurate and rapid field method for determining dissolved oxygen in water. The oxygen is determined immediately after the sample is taken.

The Determination of Arsenic in Insecticides: E. B. HOLLAND.

The cooperation of the laboratory with the entomologist in a study of arsenical insecticides necessitated a great many determinations of arsenic. This led to a review of the literature on the subject, careful consideration of the various methods offered, and some improvements in the iodine titration method as applied to the analyses of arsenites and arsenates.

Purification of Insoluble Fatty Acids: E. B. HOLLAND.

Finding it impossible to purchase insoluble fatty acids of a satisfactory quality, it became necessary to undertake a study of various methods for their purification.

The methods that seemed the best adapted for the purpose were (a) distillation of the fatty acids in vacuo, (b) crystallization from alcohol and (c) distillation of the ethyl esters in vacuo, and all were given extended trial.

It was found that while saturated fatty acids may be purified by distillation of either the acids or their ethyl esters, the latter method is less hazardous and much easier to manipulate, although more steps are required. Crystallization

is a finishing rather than an initial process of purification.

Excrement of Guayule-fed Animals: CHAS. P. FOX.

During time of drought goats feed upon the tender branches of the guayule, *Parthenum argentatum*. The leaves of this plant do not contain rubber, but there is a small amount present in the twigs. The solid excrement of the guayule-foraging animals does not contain a trace of caoutchouc.

Pingue (Colorado rubber weed) is regarded by stockmen as poisonous to sheep. In this case death is caused by clogging of the digestive organs with undigested rubber. Goats are not affected by guayule.

Dissolved Oxygen in New York Harbor: GEO. A. SOPER and PAYNE B. PARSONS.

The results of an investigation of the sanitary condition of New York harbor with respect to the dissolved oxygen is reported. The analyses were made immediately after the samples were taken.

The results show that there was not much difference between the amount of oxygen in the water at the surface and at the bottom, except that in badly polluted sections the surface samples usually contained rather less oxygen than did the deeper ones. This was contrary to expectation and is probably accounted for on the ground that the water was more impure at the top than at the bottom, a supposition supported by the fact that bacteria were most numerous at the top and by the further fact that there was more sea water near the bottom than near the top. In comparatively unpolluted sections the deep samples usually contained less oxygen than the surface samples.

When the comparatively pure sea water from the lower bay or Long Island Sound entered a polluted section, the amount of oxygen in the water of that section increased by the dilution.

Composition of the Ash of Pickles: E. H. S. BAILEY.

On account of the use of alum in the hardening of pickles the composition of the ashes of normal pickles as they appear upon the market, and also of pickles in which alum has been used, is of importance. For comparison the analyses also of green cucumbers as grown in different localities has been made. A discussion of the importance of the different constituents in the ash and the significance of the presence of these substances follows.

DIVISION OF PHYSICAL AND INORGANIC CHEMISTRY

E. C. Franklin, *chairman*

S. L. Bigelow, *secretary*

Apparatus for Measuring Vapor Pressure: I. H. DERBY, F. C. GUTSCHE and F. DANIELS.

Two thrice-tubulated glass bulbs connected together by a short glass tube are filled with glass pearls and one third filled with liquid. The bulbs may be rotated horizontally on the tubes, delivering dry air and conducting away saturated air, respectively, as an axis. To each end of this axis a short rubber tube is connected and a short section of glass tubing is placed in each of the free ends of the rubber tubes. The rubber tubes are bent down and the short glass tubes fitted loosely over vertical tubes about which they may rotate as axes. Mercury contained in a cup surrounding the junction makes a gas-tight joint which yet allows rotation of the wider tubes with the bulbs.

Important features of the apparatus are: (1) simplicity of construction and operation; (2) rapid and complete saturation, (3) saturation at barometric pressure, (4) adaptability to the determination of vapor pressures of solutions and vapor compositions, for which purposes it was primarily designed.

The Nature of Mass: J. E. MILLS.

The usual idea of mass is made clear. It is shown that the modern definition of mass as expressed in the equation, $\frac{1}{2}mv^2 = m.a.s.$, is not independent of, but is dependent upon, the attraction of gravitation. The attractive forces are compared, and it is shown that there is considerable reason for thinking that mass is a "gravitational charge." Facts bearing upon this suggestion are discussed.

Recrystallization of Barium Sulphate: H. C.

COOPER and T. S. FULLER, Syracuse University.

By recrystallizing precipitated barium sulphate from molten sodium sulphate at 1150° and dissolving out the sodium sulphate with water they obtained crystals of barium sulphate as long as 5 mm. and as wide as 1 mm. These crystals correspond to barite, the natural crystallized barium sulphate. Equally good crystals of barium sulphate were obtained by recrystallization from molten barium chloride

The Tendency of Chemical Energy Conversion:

J. E. SIEBEL, Zymotechnic Institute, Chicago.

In connection with the phase and mass law and Chatelier's theorem, the principle of the maximal work as a measure for affinity governs the tendency of chemical energy conversions.

The maximal work which is obtainable from a chemical reaction in a reversible cycle is calculable by the second law of thermodynamics, but this law, it is explained, can be more generally expressed by substituting the intensity factor by an equivalent energy factor, in which latter form, as was shown in a former paper, it is more applicable for energy conversion with saturated vapor than the former. It is now shown that the new version is also well adapted to chemical energy conversions, and that it furnishes very simple arithmetic expressions for the solutions of the problems involved.

Nucleation of Mixed Vapors in Dust-free Air:

I. H. DERBY.

The expansion ratios necessary to produce, in dust-free air, the formation of rain and fog, respectively, in mixed vapors of alcohol and water and mixed vapors of methyl alcohol and water have been determined for each pair of substances at varying concentrations. The series of ratios for each pair of substances show a minimum value for certain mixtures.

A tentative explanation of this behavior rests on the assumption that the molecules of one substance act as nucleation centers for the vapors of the other, due to the fact that the vapors of alcohols are charged with electricity opposite in kind to that found in water vapor.

The Rapid Determination of Silver and Cadmium by Means of the Gauze Cathode and Stationary Anode: R. C. BENNER and W. H. ROSS.

The study of the efficiency of the gauze electrode with a stationary anode as a rapid means for the deposition of the metals was extended to include silver and cadmium. Satisfactory results were obtained for each metal by using an electrolyte consisting of potassium cyanide in a potassium hydroxide solution. White adherent deposits were uniformly obtained in this manner. Good results, however, were not obtained when using any of the electrolytes commonly recommended for the older electrolytic methods.

The Rapid Deposition of Cobalt and Nickel by Means of the Gauze Cathode and Stationary Anode: R. C. BENNER and W. H. ROSS.

A study was made of the efficiency of the gauze electrode as a rapid means of depositing the metals nickel and cobalt with currents of from three to four amperes. Excellent results were obtained for each metal with the following electrolytes which were used in the older electrolytic methods—ammonium sulphate, ammonium acetate and ammonium formate, all in ammo-

niacal solution. In a neutral or slightly acid solution there is a tendency to anodic deposition. The results obtained with ammonium oxalate were not quite as satisfactory as with the other electrolytes named. A number of determinations were made in solutions of ammonium carbonate. This formed a most satisfactory electrolyte, either with or without the addition of ammonium hydroxide, from which to deposit these metals.

The rate at which these elements are precipitated on the gauze electrode is practically the same for all electrolytes mentioned, and, although not quite equal to the rate at which they can be precipitated when the electrolyte is agitated by mechanical means, is rapid enough for practical purposes. This method is likewise much more satisfactory because of the simplicity of the apparatus and from the fact that, if desired, the older methods with small currents may be used with the same electrodes.

The Function of the Walls in Capillary Phenomena: S. L. BIGELOW and F. W. HUNTER.

Experimental method and results were given demonstrating that the capillary ascension of water is measurably different in tubes of Zn, Cu, Ni, Al, Ag, Pt, glass, celluloid, beeswax and paraffin. From this fact the conclusion was drawn that, in all cases except where the maximum ascension is obtained, the ascension is a measure of the adhesion between the liquid and the walls rather than a measure of the cohesion (surface tension) of the liquid.

The capillary ascensions of saturated solutions of copper sulphate, gypsum, sodium chloride, potassium dichromate and alum were measured in tubes of platinum, of glass and of the solid solute. A regularity was discovered which may be stated as follows: The adhesion between a salt and its saturated solution is nearly the same for a number of salts irrespective of their chemical nature. The paper will appear in the *Journal of Physical Chemistry*.

The Hydrocarbons in Lignite: G. B. FRANKFORTER and A. P. PETERSON.

In this paper the hydrocarbons have been studied with the idea of isolating some of the heavier ones. The first work consisted in the proximate analyses of the lignites from the various localities, ranging from the southern to the extreme northern limits of the Dakota, Saskatchewan, Alberta and Alaska lignite belts.

An average of the distillation products in these different samples was about 50 per cent. carbon

residue, 1 to 5 per cent. of tar, 25-35 of condensed water. The gaseous products ranged from 15 to 25 liters per 100 grams of coal. The gaseous products were characterized by the very large amount of carbon dioxide they contained. It varied from 20 to 40 per cent., depending upon the locality of the lignite. There was an increase of hydrocarbons and a decrease of carbon dioxide in the gases from the lignites passing from south to north. The samples likewise resembled bituminous coal more closely from south to north.

Snow as a Means of Studying the Smoke Nuisance: GEO. B. FRANKFORTER.

In this paper snow has been used as a means of determining these constituents. After the snow had covered the ground for a given time, the amount on a square foot of ground was collected, melted and the solid matter filtered off and weighed. The solids were analyzed and finally the water was examined for the soluble solids and gases.

The amount of solid matter which fell during six weeks of winter weather in the cities of Minneapolis and St. Paul varied from .3 to 2.69 grams per square foot within the city limits. An average of ten analyses gave 1.43 grams per square foot. Calculated on the basis of one gram per square foot, there would be 43.56 kilograms per acre or 27.8 tons per square mile.

An average of ten analyses gave 57.16 per cent. of carbon and 42.84 per cent. of ash.

Average of ten analyses of the ash gave the following:

SiO ₂	50.50
Ca	1.13
Mg	0.31
Fe	12.10
Al	14.26
Alkalies	1.70

The snow water was then analyzed and found to contain a considerable amount of soluble matter.

An average of ten analyses gave the following:

	Parts per Million
Total solids	39.5
Chlorine	5.1
Free ammonia	0.26
Nitrites	0.038
Organic matter (oxygen consumed)	2.49
SO ₄	4.84

A New Indicator: CHAS. P. FOX.

The bark of a Congo rubber-producing vine,

said to be one of the *Landolphias*, gives an aqueous extract which exhibits the properties of an indicator. Alkalies give a deep red (magenta); acids, a light yellow to colorless. Change is sharp enough for use in technical work. The aqueous preparation is unstable. The coloring substance is precipitated by acids.

A Quantitative Expression of the Periodic Classification of the Elements: FREDERICK G. JACKSON.

A chart was shown on which the atomic weights of the elements were plotted, the members of each small period being plotted on equidistant abscissæ, and an increasing multiple of 22 being subtracted from the atomic weights. The principal families of the elements were shown by connecting their members by lines. From these lines it was graphically shown that the values at present assigned to A and Te are three or four units too great, and it was suggested that Se may also be too high. Other interesting relations were indicated between different family lines.

A Simple Hydrogen Sulfide Generator: J. I. D. HINDS, University of Nashville, Nashville, Tenn.

The apparatus is in one piece. The acid is added drop by drop to the sulfid and when the stopcock in the delivery tube is closed the acid is driven immediately away from the sulfid and action ceases. Advantages: (1) the quantity of acid in generator is always small; (2) if the acid is properly added it is practically exhausted when it passes out; (3) it is cheap, economical, no waste of gas; (4) it empties itself whenever the gas is cut off; (5) the waste flows away automatically to the sink or the open air; (6) it is always ready and may be carried from place to place.

Sulfite Method for Separating and Identifying Strontium and Calcium: J. I. D. HINDS.

Principle—Barium sulfite is difficultly soluble in hydrochloric acid; strontium sulfite is difficultly soluble in acetic acid; calcium sulfite is easily soluble in both acids.

1. To a small portion of the solution (1 or 2 c.c.) add a drop of dilute hydrochloric acid, then a few drops of a concentrated solution of sodium sulfite. A white precipitate is barium sulfite and indicates barium.

2. To another small portion of the solution add a little dilute acetic acid and a few drops of sodium sulfite solution and heat to boiling. A white precipitate is barium sulfite or strontium sulfite or both. In the absence of barium, it can

only be strontium. If barium is present, it should first be removed with chromate ion.

3. If barium and strontium are absent, precipitate calcium with the sulfite without acid.

4. If strontium and calcium are present together, there are two methods of procedure:

(a) Add to a portion of the solution sodium sulfite and warm gently, not above 30°, shake well and filter. The calcium is almost completely precipitated while much of the strontium remains in solution. Boil a portion of the filtrate. The remaining strontium separates. If strontium is absent there is no precipitate or at least a faint cloud. Pour over the precipitate on the filter a very dilute solution of acetic acid and to the filtrate add ammonium oxalate. A precipitate is calcium oxalate.

(b) Make the solution acid with acetic acid, add sodium sulfite and boil. Be sure that acid is added in excess of that required to neutralize the sulfite solution which is alkaline by hydrolysis. The mixture should be but slightly acid. Shake well. Let stand a few minutes to settle, then filter, pouring the liquid through repeatedly until it is clear. Dilute a portion of the filtrate with an equal quantity of water and add ammonium oxalate. A precipitate is calcium oxalate.

DIVISION OF PHYSICAL AND INORGANIC CHEMISTRY
Electrical Equipment for Electroanalysis and Electric Furnace Work: FRANCIS C. FRARY.

The author described specially designed switchboards for the distribution of the current from a storage-battery to a class in electroanalysis, and for the use of the individual students in the class. The boards are designed from the view-point of maximum efficiency and flexibility at minimum expense.

The arrangement of a 10-K.V.A. transformer for work in the furnace-room was described and illustrated. Four secondary coils are provided, two giving 10 volts and two 20. By means of copper straps these may be connected in all possible useful combinations. Five and 10 per cent. taps on the high-tension (220-volt) side of the transformer allow the increase or decrease of the voltage thus generated by 5 or 10 per cent., thus giving four possible voltages for each combination of the secondary coils. Suitable circuit-breakers are provided on both the primary and secondary sides of the transformer. Suitable measuring instruments are provided, and a large double-throw double-pole switch allows the bus-bars in the furnace-room to be connected to either direct or alternating current.

Abstracts for the following papers have not been received:

"Electric Osmose," Harry N. Holmes.

"The Effect of Continued Grinding on Water of Crystallization," Nicholas Knight.

"The Determination of Manganese by the Sodium Bismuthate Method," M. H. P. Brinton.

"The Sulfur Hydrosol Prepared by a New Method," Harrison Everett Ashley.

"The Dielectric Capacity of some Liquid Hydrides," R. C. Palmer and Herman Schlundt.

"A Case of Ammonia Deliquescence," W. P. Bradley.

"The Action of Ammonia upon Ammonium Sulfoeyanide," W. P. Bradley.

"On the Electrochemical Oxidation of Hydrazine," J. W. Turrentine and Willis A. Gibbons.

"Contribution to the Electrochemistry of Hydronitric Acid: the Electrochemical Corrosion of some Metals in Sodium Trinitride Solution," J. W. Turrentine.

"Experiments on the Reliability of the Borax Bead Test for Varying Mixtures of Nickel and Cobalt," P. Rothberg and L. J. Curtman.

"A Study of the Factors Influencing the Systematic Qualitative Determination of Barium," E. Frankel and L. J. Curtman.

"Rapid Electrolytic Deposition of Metals from Boiling Solutions," Franz F. Exner.

"The Pocket Spectroscope—A Neglected Necessity for the Practical Chemist," Chas. S. Palmer.

"Physical Properties of Aqueous Solutions containing Ammonia and Citric Acid," Robert A. Hall and James M. Bell.

"The Action of Hydrogen Sulfide on certain Metallic Salts in Non-aqueous Solvents," W. G. Wilcox.

"The Heat of Neutralization of Pyridine in Various Solvents," J. Howard Mathews.

"The Use of a Dewar Flask in Measurements of Heats of Neutralization," J. Howard Mathews and A. F. O. Germann.

"Surface Tension Measurements at the Surface between two Liquids," W. D. Harkins.

"Equilibrium in the System Lead Nitrate Pyridine," J. H. Walton, Jr., and R. C. Judd.

"The Action of Oxides of Lead on Normal Potassium Tartrate," F. C. Krauskopf.

"On the Interaction of Metallic Sodium and Mercury," L. Kahlenberg and David Klein.

"The Vapor Pressure of Dried Calomel," Alexander Smith and A. W. C. Menzies.

"The Vapor Pressures of Sulfur," Allan W. C. Menzies.

"A Lower Limit for the Critical Temperature of Mercury," Allan W. C. Menzies.

"The Diffusion of Oxygen through Solids," G. B. Frankforter and R. S. Callaway.

"On the Mechanism of the Reactions of Alkyl Halides with Sodium Ethylate and with Sodium Phenolate," S. F. Acree, H. C. Robertson and E. K. Marshall.

"The Effect of certain Neutral Salts on the Hydrolysis of Ethyl Acetate at 100°," W. E. Henderson and D. R. Kellogg.

"The Violet Coloration of Ferric Alums and Nitrate," W. E. Henderson.

"Electrical Equipment for Electroanalysis and Electric Furnace Work," F. C. Frary.

"The Fluorescence of Anthracene," Wilder D. Bancroft.

"Chemical Properties of certain Radioactive Substances," B. B. Boltwood.

"Equilibrium in Carbonate Solutions," Herbert N. McCoy.

"Radioactivity of Thorium Products," Herbert N. McCoy.

"Is the Action of the Enzyme Invertase Reversible?" C. S. Hudson and H. S. Paine.

DIVISION OF INDUSTRIAL CHEMISTS AND CHEMICAL ENGINEERS

A. D. Little, *chairman*

F. E. Gallagher, *secretary*

Platinum Laboratory Utensils: PERCY H. WALKER, F. W. SMITHER.

The article calls attention to the fact that a great deal of platinum ware, such as crucibles, dishes, etc., offered for sale at the present time is of inferior quality, some of it being absolutely unfit for use in a laboratory.

Methods of testing platinum laboratory apparatus are described, and suggestions for a standard specification for such ware are given.

Solubility of Oxygen in Sea Water: GEORGE C. WHIPPLE and MELVILLE C. WHIPPLE.

Temperature ° C.	Distilled Water (Committee on Standard Methods of Water Analysis)	Dissolved Oxygen in Milligrams per Liter				
		Chlorine, 0	Chlorine, 5,000	Chlorine, 10,000	Chlorine, 15,000	Chlorine, 20,000
0°	14.70	14.62	13.79	12.97	12.14	11.32
5	12.80	12.80	12.09	11.39	10.70	10.01
10	11.31	11.33	10.73	10.13	9.55	8.98
15	10.14	10.15	9.65	9.14	8.63	8.14
20	9.19	9.17	8.73	8.30	7.86	7.42
25	8.35	8.38	7.56	7.96	7.15	6.74
30	7.60	7.63	6.86	7.25	6.49	6.13

Solubility of Oxygen at Different Temperatures in Water containing Different Amounts of Chlorine

From original experiments made with the Winkler method and experiments by Fox, using a method of direct absorption, a table has been prepared showing the solubility of oxygen at different temperatures in sea water and brackish waters containing different amounts of chlorine. The results in condensed form are given above.

The Work of the Chemical Laboratories of the Bureau of Mines: J. K. CLEMENT.

The chemical work is divided among a number of separate laboratories, each carrying on its own lines of work under the direction of its own chief; the whole forming a group of more or less independent units. In general, the problems of the chemists are closely connected with those of the mining and mechanical engineers.

The Fuel-testing Laboratory is occupied mainly with the analysis and calorimetric testing of fuels, including coal, coke, lignite and peat. In addition to analyzing samples of all fuels used in the boiler and gas-producer tests of the bureau, ultimate analyses and calorific value determinations are made on mine samples of coal collected by the U. S. Geological Survey, as well as by certain state geological surveys.

Fusibility and Clinkering of Coal Ash.—In the use of coal under steam boilers, the property next in importance to its calorific value is perhaps the fusibility of its ash. Indeed, some coals, which have a high heating value, are worthless for making steam on account of their tendency to clinker and adhere to the grate bars. The relation between the fusibility and clinkering properties of coal ash and its chemical and mineralogical composition is now being investigated.

Chemistry of Petroleum Technology.—The bureau is making a study of the commercial bodies contained in the crude petroleum of the United States; of the methods for their separation and purification and of their economic uses. The California fields have been selected for first study.

Combustion Investigations.—The processes of combustion in the boiler furnaces are being investigated in a furnace specially designed for the purpose.

The process of producer-gas formation is being studied from a physical-chemical standpoint, and an attempt will be made to apply, on a commercial scale, the results of laboratory experiments on the rate of formation of carbon monoxide and water gas.

The Composition of Coal.—The object of this investigation of the bureau is the isolation and identification of some of the constituents of coal.

The Volatile Matter of Coal.—The quantity and composition of the gases evolved from various coals, when heated to temperatures of from 400° to 1000° C., have been determined. In the experiments which are now in progress, particular attention will be given to the influence of the rate of heating on the character of the gases produced; to the initial composition of the gases at the instant of liberation, and to the thermal decomposition of these gases during passage over heated surfaces.

Weathering and Deterioration of Coal.—In cooperation with the Navy Department, the Panama Railroad Company and the University of Michigan, the bureau is conducting an extensive series of tests on the deterioration of various coals in storage both in the open air and when submerged in fresh water and sea water.

The Accumulation of Gas from Coal.—The quantity and rate of formation of inflammable gas from freshly mined coal, at ordinary temperatures, and the rate of absorption of oxygen by the coal have been determined.

The spontaneous combustion of coal is being investigated by the bureau. Statistical information will be combined with the results obtained in the laboratory.

The Burning of Coal in Mines under a Diminished Supply of Oxygen.—The factors governing the propagation or extinguishing of fires in mines are being investigated.

Examination of Mine Gases.—Examination is made of samples from normal mine air, from the after-damp following explosions, from stagnant areas and from burning areas during mine fires. Particular attention has been given to the detection of small amounts of carbon monoxide.

The Chemistry of Explosives.—Chemical analyses are made of all explosives submitted to the bureau for test, of the products of combustion of explosives, and of electric detonators, blasting caps and fuses.

Coal-dust Explosions.—The two greatest sources of danger encountered in mining operations are the explosive gases given off by the coal, and the finely divided coal dust which exists throughout most coal mines. The first danger can be overcome by increasing the ventilation in the mines. Unfortunately, this increases the danger from the coal dust by the removal of its moisture.

Abstracts for the following papers have not been received:

"An Improved Process for Finishing Beef Extract," J. T. Donald.

"Self-recording Efficiency," A. D. Smith.

"Efficiency in Acid Phosphate Manufacture," F. B. Porter.

"Chemistry as a Factor in Foundry Efficiency," Walter P. Schuck.

"Note on the Utilization of Lumber Waste," Jas. C. Lawrence.

"The Use of Peroxide for Silk Bleaching," W. S. Williams.

"Economical Steam Generation," C. F. Wood.

"The Importance of Eliminating Air Leaks in the Manufacture of Sulfite Acid," C. M. Ballard.

"The Spontaneous Combustion of Coal," S. W. Parr and F. W. Kressman. (Illustrated by lantern.)

"The Modern Manufacture of Portland Cement from the Chemical and Mechanical Standpoint," George P. Dieckmann. (Illustrated by lantern.)

"Errors in Determining the Sizes of Grain of Minerals and the Use of Surface Factors," Harrison E. Ashley and Warren R. Emley.

"The Utilization of Smelter Smoke in Preparing Sulfates from Clays," Harrison Everett Ashley.

"The Determination of Water in Mixed Paints," G. A. Abbott.

"Linseed Oil," A. H. Sabin.

"A Modified Process for Cane-sugar Manufacture," Harry McCormack.

"Notes on the Production and Composition of Mexican Pulque and Mescal," H. W. Rohde.

"The Importance of a Standard Temperature for Specific Gravity-determinations and for Standardizing Standard Measurements," G. W. Thompson.

"Soaps from Different Glycerides—Their Germicidal and Insecticidal Values in Themselves and when Mixed with Active Agents," H. C. Hamilton.

"Experiments on the Corrosion of Iron," W. D. Richardson.

"The Determination of Moisture in Coal," John White.

"The Disintegration of Concrete in Septic Tanks," Wm. M. Barr.

"Tensile Strength of Hair Cloth," Chas. P. Fox.

"The Exact Electrolytic Assay of Refined Copper—(1) Standard Method, (2) In Solenoid with Revolving Electrolyte," Geo. L. Heath.

"The Determination of Arsenic and Antimony in Copper, including a New Rapid Volumetric Method," Geo. L. Heath.

DIVISION OF ORGANIC CHEMISTRY

E. C. Franklin, *chairman*Ralph H. McKee, *secretary*

No abstracts have been received.

"The Oxidation of Styrolene Alcohol," Wm. L. Evans and Lou Helen Morgan.

"The Oxidation of Propylene Alcohol," Wm. L. Evans and Edgar Witzemann.

"The Action of Ethylates on Nitrites," S. F. Acree and E. K. Marshall.

"Some Ketoester Addition Products," Richard S. Curtiss, L. F. Nickel and R. H. Lewis.

"On the Colored Salts of Nitromalonic and Dinitroacetic Esters," Richard S. Curtiss and John A. Kostalek.

"The Action of the Derivatives of Tolyhydrazines on Quinones," Wm. McPherson and George W. Stratton.

"An Important Method for the Preparation of Orthohydroxyazo Compounds," Wm. McPherson and Cecil Board.

"Para Brom Phenyl Isoureas," Robert A. Hall.

"The Constitutions of Fucose and Rhodose," C. S. Hudson.

"The Constitution of Dehydracetic Acid," Wm. J. Hale.

"Amine Salts of Organic Acids," J. Bishop Tingle and T. E. Layng.

"Organic Arsenic and Antimony Compounds," J. Bishop Tingle and K. Clark.

"The Action of Alcoholic Ammonia on *ab*-Dibromopropionic Acid," Wm. H. Warren.

"Tribromtertiary Butyl Alcohol," T. B. Aldrich.

"On the Constitution of the Salts of Acridine and its Derivatives," L. H. Cone.

"The Hydrocarbons in the Various Forms of Lignite," G. B. Frankforter and Andrew P. Peterson.

"The Polymerization of the Pinenes," G. B. Frankforter and Frederick Poppe.

CHEMICAL EDUCATION SECTION

C. F. Burgess, *chairman*

The Use of the Blue-print in the Teaching of Industrial Chemistry: FRANCIS C. FRARY.

Instead of the time-honored methods of showing charts or drawing diagrams of machinery on the black-board, the author recommends the use of the lantern-slide and the blue-print: the lantern-slide to be shown to the class, and a blue-print of the apparatus, made from the same negative as the slide, to be given to the student to paste in his note-book. Thus time is saved in the classroom, and the student has a better idea of the apparatus. The system was developed by Dean

W. R. Appleby, of the Minnesota School of Mines, for use in the teaching of metallurgy, and the author has found it likewise helpful in the teaching of industrial chemistry and electrochemistry.

Proficiency in Qualitative Analysis: H. C. COOPER.

The results of an inquiry among prominent American chemists conducted to ascertain how students can best be prepared to make reliable analyses of miscellaneous materials were reported. It was the majority opinion that the students should be given rather extensive drill in the thorough qualitative analysis of minerals and technical products. Since qualitative analysis is generally taught to freshmen or sophomores, praiseworthy mention was given to the plan of conducting a supplementary course in the subject for the advanced students. Considerable discussion was aroused by the question of teaching students to make abbreviated analyses.

Points of View in the Teaching of Industrial Chemistry: JAMES R. WITHROW.

Defining industrial chemistry as the study of the manufacture of chemical substances and the production of commercial products with the help of chemical operations the point of view of the lecture work was taken up. Each industry is considered as a problem for the solution of the difficulties of which much work has been done and much remains to be done. The student is also made to analyze each of the industries with reference to operations involved, such as distillation, condensation, filtration, etc. These points of view give the student the desirable attitude of mind which makes him analytically critical of the industries and also makes him scrutinize the methods used to overcome difficulties in a way that makes for increased personal efficiency. With regard to the laboratory work, the usefulness of familiarizing the student with the "tools of the trade" is emphasized, but the mere requirement of such familiarity is by no means the highest object to be obtained. Emphasis is laid rather on the solution of problems in the study of cost and acquiring of data for use in works experiments on the manufacture of commercial products or utilization of by-products. The difficulties arising give the student a keen appreciation of the value to him of the library and all work, whether theoretical or practical, which is within his reach. In a word, the work is industrial research. It shows the student how to attack problems; familiarizes him with the spirit of manufacturing chemistry; gives him the proper attitude of mind toward his science; makes him

appreciative of the labor of others, and makes him conscious of the meaning of the responsibility of industrial service.

Abstracts for the following papers have not been received:

"A Laboratory Course in Chemical Engineering," W. H. Walker and Wm. K. Lewis.

"The Preparation of 'Known' Solutions in Qualitative Analysis," L. J. Curtman.

"Instruction in Physical Chemistry—Two Modifications," R. Stevenson.

"Suggestions as to Certain Desirable Changes in Chemical Nomenclature," Edwin Booth.

"Quantitative Analysis as a Science," W. D. Harkins.

DIVISION OF FERTILIZER CHEMISTRY

F. B. Carpenter, *chairman*

J. E. Breckenridge, *secretary*

The Determination of Nitrogen in Commercial Ammoniates of High Nitrogen Content. Report of the Committee on Nitrogen, Division of Fertilizer Chemists: PAUL RUDNICK, *chairman*.

Three samples were prepared, namely, dried blood, tankage and a complete fertilizer, all the nitrogen of which was derived from the same lot of dried blood. Forty-eight laboratories reported results by all the usual methods, including an average of 223 individual moisture determinations and 259 individual nitrogen determinations on each of the three samples.

The results were grouped into tables according to the methods employed. The results by the absolute or cupridoxid method were unsatisfactory and only one set of determinations by the soda lime method was received.

The individual variations from the arithmetical means in the several tables were large, but the average results of the "wet combustion" methods showed a very satisfactory agreement.

The Kjeldahl-Gunning method gave the highest results.

Special attention is called to the necessity for special precautions in the preparation and packing of samples representing shipments of these and similar commodities, in order that changes in the moisture content may be reduced to a minimum.

Abstracts for the following papers have not been received:

"The Results of Soil Investigations as Affecting the Use of Fertilizers," F. B. Carpenter.

"The Growth that Forms in Neutral Ammonium Citrate," Robert A. Hall.

"What Allowance should be made for Variation in Guarantee and Analysis of Fertilizer, and what, if any, Credit should be given a Manufacturer for an Excess in one or more of the Ingredients, to Offset a Deficiency in Another," R. E. Rose.

"Some Causes affecting the Accuracy of the Kjeldahl and Gunning Methods for the Determination of Nitrogen," Ray Henry.

"A Bacteriological Method for Determining Available Organic Nitrogen," J. M. McCandless.

"Uniform Rules and Regulations for the Admission of Ammoniates throughout the Southern States," J. M. McCandless.

"Availability of Organic Nitrogen," J. E. Breckenridge.

"The Use of Nitrate of Soda in Commercial Fertilizer," Charles S. Cathcart.

G. A. Farnham reported for the Committee on Phosphoric Acid.

J. E. Breckenridge reported for the Committee on Potash.

C. F. Hagedorn reported for the Committee on Phosphate Rock.

DIVISION OF PHARMACEUTICAL CHEMISTRY

A. B. Stevens, *chairman*

B. L. Murray, *secretary*

No abstracts were received from this division.

"Citro-compounds of Iron," A. B. Stevens.

"Pharmacopœial Standardization," A. B. Stevens.

"Does Oil of Sassafras contain Camphor?" Emerson R. Miller and G. H. Marsh.

"Assay of Gelsemium Root," L. E. Sayre.

B. E. CURRY

DURHAM, N. H.

THE CHICAGO ACADEMY OF SCIENCES

THE annual meeting of the Chicago Academy of Sciences was held January 10, 1911, at which time Dr. T. C. Chamberlin was reelected president; Mr. A. L. Stevenson, first vice-president; Dr. U. S. Grant, second vice-president, and Dr. Wallace W. Atwood was again made secretary. The reports of the officers of the academy showed that during the past year the work and the influence of the academy have become more strongly educational. The scientific collections and exhibits in the museum are carefully maintained and will always be available for specialists to study, but the museum is rapidly taking on a distinctly educational policy and the exhibits are being appropriately altered or replaced.