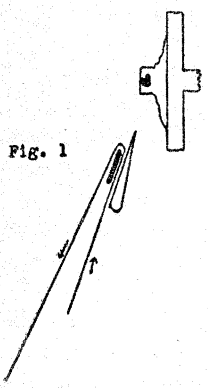
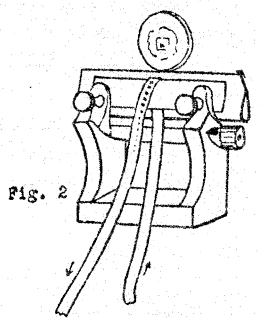
A SIMPLE METHOD OF DEALING WITH ELECTRIFIED MICROSECTIONS

ELECTRIFICATION of the sections is a frequent cause of trouble in microtomy. The sections when cut fly back into the paraffin block when the block rises for the next cut, or, if a short ribbon has already been cut, this flies to the knife, twists and curls, or "bunches up" on the knife in such a way that it is an exceedingly wearisome task to seriate the sections, and requires almost infinite care and patience. The causes of electrification may be various. It is owing either to atmospheric conditions or to faulty methods of infiltrating or blocking. The use of a metal drum on which the sections may be wound as cut, reduces somewhat, as is well known, the difficulty experienced because of the electrification of the sections. The suggestion of Guyer (p. 47 of his revised ed. of *Animal Micrology* 1917) to postpone cutting till a more favorable time is not very satisfactory to one who is compelled, because of press of time, to cut continuously. The following simple device I have used with electrified sections and have found very satisfactory. The labor of mounting such sections, by its use, has been very much reduced, and I believe it will be quite generally serviceable.





Figures 1 and 2 show the whole device, which is adapted to any of the common types of rotary microtomes for the cutting of serial sections. It consists of a thin blade of celluloid (one of the 6-inch rulers furnished by the biological supply-houses does very well). This is screwed flat against the section-knife by means of the usual knife-holding screws of the carriage. (Fig. 2). A long narrow strip of thin, tough paper is passed up between the celluloid blade and the microtome knife, until about 3 cm. of it protrudes above. After the paraffin block has been properly trimmed and adjusted to the knife, the sections are cut, and as each one is cut, it is attracted and held by the paper-strip which is pulled along with the fingers so as to produce a series. (Fig. 2). When the strip is nearly filled with sections, it is taken and fastened to the table or board with thumb-tacks, to keep it from curling, and another strip substituted.

By means of this extremely simple device, the writer has found it possible to cut with excellent seriation material which otherwise, owing to electrification, would have been impossible.

S. W. GEISER

ZOOLOGICAL LABORATORY,
THE JOHNS HOPKINS UNIVERSITY

THE AMERICAN CHEMICAL SOCIETY

(*Continued*)

DIVISION OF INDUSTRIAL AND ENGINEERING CHEMISTRY

H. D. BATCHELOR, *Chairman*
H. E. HOWE, *Secretary*

SYMPOSIUM ON FILTRATION

D. R. SPERRY, *Chairman*

Filter cloth and its relation to filtration: ALVIN ALLEN CAMPBELL. Filter cloth is a very important consideration. Principal kinds are made of cotton, wool, jute, hemp, nickel and monel metal. Cotton duck the most used, but being replaced by materials of longer life though not necessarily better filterers. Solids really are the filter medium, the cloth is merely the retaining wall. The combination of strength, fineness and rapidity is what is wanted. Life of cloths depends on chemical action tending to destroy its use. Considers monel metal the best cloth material in most cases. Gives interesting list of various acids and salts and whether or not monel metal is recommended. Warns against electrolytic action on monel cloths, citing potassium permanganate as a case in point. Gives opinion

as to round, square or rectangular openings. Wire cloth a failure in filtering certain colors. Filter aids work well with wire cloth. Does not recommend that wire cloth be rolled.

Filter aids: C. P. DERLETH. The term filter aid is defined and a list of materials used for this purpose given. Materials to which the term Kieselguhr is applied are discussed. Author divides filtration problems into three classes on the basis of whether the solids in the mixture are rigid, non-rigid or a combination of the two. A discussion is given as to the manner in which a filter-aid may be used and the advantages accruing therefrom, in each of the three cases. Desirable characteristics in filter-aids is given. Filter-aids are said to improve clarity of filtrate, reduce power consumption, reduce loss of liquid in cake, reduce labor in cleaning cloths, increase life of cloths, and increase rate of flow.

The feeding of filters: J. F. SPRINGER. Defines "feeding" as consisting of the transmission under pressure of the unfiltered liquor from a point where it is received from storage to the inlet aperture of the filter. Necessary equipment is pipe-line, pump and power. Suggests that in order to keep pump and valves clean from solids, precipitation of the solids when possible ought to be done either in filter or between pump and filter. Suggests possibility of solids being dissolved before reaching pump and then again precipitated between pump and filter. Describes feeding devices made of various materials and the corrosive action of certain substances thereon. Discusses suction, gravity and pressure feeding and appropriate apparatus. Steam, power-reciprocating, centrifugal pumps and montejus are dealt with.

Fundamental laws of filtration with suggestions regarding research work: D. R. SPERRY. The writer develops a formula which is a statement of the fundamental laws governing filtration. This is done to form a foundation upon which filtration may be put upon a scientific basis. Definitions of filtration, porous mass, filter-base and filter are given. Three indispensable conditions of filtration are difference in pressure between the two sides of the porous mass, a filter base and a filter. A study is made of the phenomena of filtration and it is found that the rate of flow of filtrate at any instant equals the rate of flow through the cake at that instant were there only liquid above the cake. With this as a basis a study is made separately of the laws of flow through cake and the laws of building up of cakes. The two expressions are combined into one which is the fundamental law of filtration as follows: $Q = \sqrt{WPT + N^2} - N$ (for constant pressure conditions); $Q = \frac{WP}{2M} - \frac{WRM}{2}$ (for constant discharge conditions); where Q = total discharge, P = pressure, T = time, R = resistance of cake, Rm = resistance of porous mass, c/o = per cent. of solids, M = constant discharge rate, K = rate of disposition, $W = \frac{2K}{R\%}$, $N = \frac{KRm}{R\%}$. Units for measuring K, the rate of deposition, and R, the resistance of cake, is given. A list of research suggestions follows.

Washing filter presses: EUSTACE A. ALLIOTT. Washing is used to recover a valuable liquor from the solid particles which retain it or to free such particles from impurities dissolved in the adhering liquor. Generally wash water ought to be as little diluted as possible; hence the smallest quantity should be used. Adsorption, capillary diffusion, formation of chemical compounds, and colloid formation on removal of electrolytes are disturbing factors in washing. Each of these factors is discussed. Simple washing involves too much space and care. For best washing results plate and frame type filters should be used with thorough washing. Air vents should be provided at top of wash chambers, wash must leave at top of press and enter at bottom. Considers various mechanical appliances for washing, hydrometer bowls, wash pumps, and montejus. Under ideal conditions wash equal to one displacement volume should effect complete washing. A number of washing results is given from actual practice, showing displacements volumes of 1.6 to 5.5. Describes stage washing. Gives a number of interesting wash curves, and cuts of mechanical appliances for washing.

Pulp or filtermasse filters: E. E. FINCH. Divides filters into two classes—those whose primary purpose is for clarification and those for retaining solids. The pulp filter belongs to the first class and uses cellulose as a filtering medium. Gives a short history of the pulp filter. Origin was probably in Germany. Gives a list of various substances used as a filter-masse with appropriate remarks. Concludes pure cotton masse the best. Describes method of preparing and using filter-masse. Pulp filters can be constructed for handling liquids which must not touch the ordinary metals. Discusses advantages of a clear product for manufacturer. Filtration in pulp

filters is a violent agitation which may cause precipitation requiring re-filtration. Gives methods of treating liquids by pasteurizing, chilling or settling. Mentions filtration of glue and gelatine.

Atkins-Shriver automatic filter press: H. D. ATKINS. This apparatus is a modified form of a round, center-feed filter press. A shaft passes through the center openings, on which is mounted plows, one in each chamber. The press is mounted on trunnions and is filled in the vertical position. When filled the shaft is rotated and the plow by moving in a spiral manner peels off the cake from the chambers. The cake pieces fall out of the press through the central openings. The plows do not remove all the cake but leave a thin layer on the cloths. If it is desired to remove this layer it may be sluiced off. For assembling and clothing the press is swung into the horizontal position. Washing may be done in the press. Claim is made that this press saves wear and tear on cloths, saves labor, washes thoroughly, and is well adapted to arrangements to carry away cake. This type of press costs more than the ordinary filter press per unit of filtering area.

Vallez rotary filter: H. A. VALLEZ. This apparatus consists of a cast-iron cylinder so made that by removing bolts it can be split lengthwise disclosing a hollow shaft on which is mounted the filter leaves. Filtrate from leaves is drawn away through center of shaft. When cylinder halves are bolted together the material to be filtered is pumped into the interior under pressure, causing filtrate to issue from shaft. Filter surfaces may be sluiced off. Extra shafts with leaves may be kept to facilitate repairs. Leaves are spaced 2½, 3 or 6 inches apart. A screw conveyor at bottom of cylinder removes the solids, which drop off the leaves when pressure is relieved or a back air pressure applied. Claim is made that the rotation of leaves while filtering causes even depth of solids, indicating uniform washing. Used in sugar factories.

Centrifugal filters: H. C. BECKMAN. There are two classes of centrifugal filters, those in which the drum is perforated and those in which the drum is imperforated. The first class is used largely in sugar factories. Experiments have been made in which filter paper or cloth is used over perforations. Has no advantage over ordinary pressure filter and several disadvantages. Centrifugals of the second class use filter paper and act in a measure as a self cleaning filter due to the fact that the solids are discharged from the discs by centrifugal force. Due to this fact small areas have large capacity. A disadvantage is the smallness of size. A ten-inch drum eight inches high with twenty seven-inch filter plates operating at 6,000 R.P.M. is the largest size found commercially practical. Costly liquids like physiological serums, expensive varnishes, etc., are handled by centrifugal filters. Maintenance and upkeep are nominal. Largest size requires about two H.P. and about four square feet floor space.

Modern leaf type filters: ROBERT C. CAMPBELL. Description is made of Kelly and Sweetland leaf filters. Operating instructions for complete cycle are given. Washing is effected by stopping formation of cake while there is yet space between adjacent leaves. Eighty-five to 125 per cent. of the weight of discharged cakes is required for complete washing. A disc filter of the continuous suction type in which discs are mounted on a rotating shaft which allows them to dip into the mixture to be filtered is described. Pressure disc filters are suitable for handling sludges. Containing from less than one per cent. of suspended solids to the highest per cent. of solids which can be conveniently pumped and drained from filter. By use of Kisselguhr colloidal or gummy solids may be handled. Suction disc filters are recommended for sludges containing over 10 per cent. of comparatively free filtering solids wherein a cake of greater than one fourth inch thickness may be built in from one to eight minutes. Average capacity of suction filters is from 300 to 700 pounds of dry solids per square foot filter area per 24-hour day. Data is given regarding size of air and sludge pumps for pressure or suction disc filters, also water required for sluicing. When suspended particles are soft and compressible the plate and frame filter will produce a drier cake than leaf filters. Claims leaf filters have lower cloth consumption than plate and frame filters.

Oliver continuous filters: H. A. MORRISON. (1) Types manufactured—being a brief description of the individual kinds made. (2) General principles involved—covering the use of the continuous vacuum filter. (3) Characteristics to be considered in filter applications. (4) Uses—with generalized statement of the more important fields of operation and special description of the unusual problems we have solved. (5) Installation and operating costs—showing complete installation and operating costs in detail. (6) Advantages—realized by use of continuous vacuum filters as compared with plate and frame presses

and other intermittent types. (7) Limitations and disadvantages.

Suction filtration: G. D. DICKEY. After a brief outline of the development of suction filtration, there are taken up the four main points of interest to filtration operators, viz.: Cake formation, washing, drying, and discharge. Under "Cake Formation," there is discussed the various factors which modify cake building in suction apparatus. Examples are cited as to capacities and rates of flow of specific materials under varying conditions, which will illustrate the influence that these conditions exert over the deposit of the filter cake. Following the discussion of the filter cake comes that of washing of the cake, which of course is dependent upon the formation of the cake itself, but which can be greatly aided or hindered by the filter operator. The discussion of cake drying and discharge is also based primarily upon the cake formation, but allows of many modifications before obtaining the desired results. Next there is given a brief description of the construction and operation of the open tank type of filter, the continuous rotary filter, and the continuous rotary hopper dewaterer, together with the advantages and disadvantages of each type. A number of lantern slides have been provided, so that the discussion of the construction and operation can be illustrated. In conclusion, there is given specific data as to the handling of a number of materials by the three types of apparatus above mentioned.

Industrial filter media: ARTHUR WRIGHT. Defines industrial filtration as the separation of a comparatively large amount of solids from small volumes of liquid, hence small rates of flow are permissible and filter cloths used as contrasted with the municipal filtration where gravel beds are used and conditions are the opposite. Selection of filter fabric depends upon whether for non-corrosive or corrosive liquors. For the latter, wool, metal, asbestos, stone, etc., is used, while for the former, cotton is used. Describes various weaves of cotton and its use. Fabric filtration should be of surface type, and not bed filtration where solids enter interior of the medium as in loose thick duck. Suggest superficial layer of thin muslin to prevent bed action, permitting cake to fall off easily. In certain kinds of filters the cloth porosity must be of definite kind to permit use of back pressure. Cake adheres more strongly to unnapped cloth. Discusses drainage provided under cloths. Precoating cloths should be used where initial filtrate must be clear. Shrinkage and stretch of cloth is considered. Mentions incrustation due to lowering pressure and suggests action to be taken.

The use of filter-cel for industrial filtration processes: G. M. HICKEY. Filter-Cel, a porous cellular product, is used as a filter aid, by mixing a small percentage with the liquor prior to filtration, overcoming slimes and giving brilliant filtrates. In cereal beverage filtration, addition of one fourth pound of Filter-Cel per barrel insures complete removal of yeast cells, gives brilliant product and permits use of modern pressure filters. In crude and refined vegetable oils it aids in the removal of foots, soaps and slimes, giving clearer filtrates that requires less bleach for refining. When mixed with the bleaching agent, it increases the capacity of filter and gives dryer cakes. Apple products and fruit juices are mechanically clarified by filtration with small quantities of Filter-Cel. Soap lyes and fats are clarified using one per cent of Filter-Cel, improving filtration and the quality of by-products. Catalytic agents from hydrogenation processes are completely removed by filtering with Filter-Cel.

Plate and frame filter presses: G. B. RICE. The filter press includes a large filter area in a small floor space, high pressure can be used, the apparatus is simple, unskilled labor only is required for operation, and repairs are quickly made. Considers the plate and frame type the best form of filter press. Describes washing and various combinations used in filter presses. Filter presses can be made of various materials, as iron, for ordinary materials, wood for weak acid liquors, lead for strong sulphuric acid. For wooden plates resinous woods are best, as yellow pine; such wood will stand 25 per cent. cold HCl. Hot solutions tend to destroy the resin, so for that purpose maple or oak is best. Describes operation and storage of wood presses. Discusses filter plate surfaces, closing gears, and filter cloths. For most aqueous solutions, cotton cloths are good, but for strong acid solutions asbestos, wool or camel's hair cloth is suitable. Wire cloths made of monel metal, copper, nickel and bronze can be used.

The filter press: D. R. SPERRY. The filter press is defined as a press employed for holding together the component parts of a filter. The component parts of the filter consist of plates or plates and frames. The filter press is described by aid of illustrations. Recessed and flush plate and frame operation is defined. Filter plates and frames may be made of various materials to suit the substance handled. This is also true of filter-

bases. A discussion of plate surfaces tends to show that correct design should be for long wear of cloth and proper drainage. Also that the contact area of the cloth does not reduce the net filtering area as might be supposed. The filter press comprises most filter area per unit of floor space, can employ high pressures, has low repair costs, produces the driest cake, is economical in clothing, can be operated by cheap labor and is the most universal and widely used filter apparatus to-day. Eleven plant installation views are given.

A symposium on the chemistry of gases and fuel was also held with C. H. Stone chairman and R. S. McBride secretary. The following four major subjects were discussed:

(*a*) *Coke-oven problems,* discussion to be opened by W. H. BLAUVELT, F. W. SPERR and others.

(*b*) *Low temperature carbonization of coal,* discussion to be opened by H. C. PORTER.

(*c*) *Gas works control,* discussion to be opened by E. C. UHLIG, J. R. CAMPBELL and O. A. MORHOUS.

(*d*) *Gas analysis and its applications,* discussion to be opened by G. W. JONES, E. R. WEAVER and A. H. WHITE.

Two new methods for determining light oil in coke oven gas: ARTHUR L. DAVIS. The most accurate and thoroughly reliable method that has been developed to the present time utilizes activated carbon as the absorbing medium. Absorption of the light oil is rapid and the carbon is very convenient to handle. The absorbed light oil is removed by distillation of the enriched carbon with cresol and the subsequent treatment of the distillate with caustic. The true light oil recovered, uncontaminated with wash oil, may be examined and its quality determined. A very satisfactory means of absorbing light oil is to pass the gas through a plate and bell tower, laboratory size, using cresol as the absorbing medium. A tower of this type is imperative since incomplete absorption will be obtained using other than this general type of equipment when any liquid absorbent is used. The cresol is stripped of the light oil and the distillate agitated with caustic. The light oil obtained is true light oil with no high boiling ends due to the lower boiling portions of wash oil being present.

Standardizing gas combustion by premixing portions of air with gas: N. H. GELLER.

A chemically controlled automobile: GEORGE G. BROWN, JR. The average motor car wastes twice as much energy as is converted into useful work. The thermal efficiency averages not over 15 per cent. This loss, entirely preventable, is a waste of a valuable and limited natural resource, petroleum. In all industrial combustion problems increased efficiency can be obtained by returning as much heat as possible from the exhaust gases to the combustion zone by preheating the air. Another factor, known as turbulence, which results from the velocity of the mixture entering the cylinder, has an equally noticeable effect upon the rate of combustion. Repeated tests have shown that 30, 35, 40 miles per gallon and even more may be obtained driving at constant speed along a level highway and burning a lean hot mixture. It has been found that the two variables, temperature of air and manifold suction, are sufficient in themselves to supply all the automatic control desired. Working along these lines a carbureter has been designed from a scientific and mathematical standpoint that can be made to deliver a mixture of any proportions desired under any conditions. It has been found possible to obtain 35 to 40 miles per gallon on a standard Ford touring car with equally quick acceleration and even more flexibility than could be obtained with standard equipment giving 20 miles per gallon under the same conditions.

Theoretical maximum temperature: GEORGE G. BROWN, JR. (1) A comparison of the values for specific heats of the products of combustion as obtained by the various investigators. (2) Calculation of maximum temperatures using a table of mean specific heats, or thermal capacities: *a.* Estimating temperatures and solving by trial and error; *b.* The graphical method of Damour. (3) Calculation of maximum temperature using the equations for thermal capacities: *a.* Algebraic solution; *b.* Slide rule solution; *c.* Graphical solution.

The formation of oxides of nitrogen in the slow combustion and explosion methods in gas analysis: G. W. JONES and W. L. PARKER. Procedure and results of investigation are given showing the amounts of oxides of nitrogen formed when gases are analyzed by the slow combustion and explosion method. The following conclusions were obtained: The production of oxides of nitrogen by the slow combustion method when the time of burning is not more than three minutes and the wire heated not greater than a bright yellow is within the experimental error in routine gas analysis. Under the above conditions not more than .003 c.c. of oxides of nitrogen

were produced by the explosion method when air was used as the oxygen supply. When mixtures of air and oxygen were used as the oxygen supply in the explosion method appreciable quantities of oxides of nitrogen were produced which are too large to be disregarded in gas analysis. The method used for determining the quantity of oxides of nitrogen produced was a modification of the di-phenol sulphonic acid method as used in water analysis.

The present status of methods used for fuel gas analysis: G. W. JONES. The constituents present and difficulties encountered in the accurate analysis of fuel gases are given. The methods used at the present time, considerations which must be taken into account in choosing a particular method, the comparative accuracy of the different methods and debatable points which require further consideration are discussed.

Electric heat for thermal processes: E. F. COLLINS.

Humidity equilibria of various common materials: ROBERT E. WILSON. A knowledge of the equilibrium amount of moisture held by various materials as a function of the relative humidity of the air is very important for a variety of purposes. The author presents determinations by a method previously described in the *Journal*, of the humidity equilibria of the following materials: cotton, linen, paper, jute, hemp, viscose silk, cellulose nitrate silk, cellulose acetate silk, rubber, leather, feathers, catgut, tobacco, crackers, bread, macaroni, etc.; and includes data gathered from various sources on other materials, such as wool, silk, paper half-stuffs, timber, flour, etc.

The frictional resistance to the flow of viscous liquids through elbows: ROBERT E. WILSON, WILLIAM H. MCADAMS and M. SELTZER. The frictional resistance to the flow of liquids through elbows has been the subject of a considerable number of scattered experiments, but the results are seldom expressed on any uniform basis and in many cases the methods of measurement were faulty. Furthermore, there is practically no data on the frictional resistance to flow through elbows for very heavy oils flowing in straight line motion. The authors present a series of data covering the whole range, from highly viscous oils to water, and show that, while the customary rule of assuming an elbow to be equivalent to thirty or forty pipe diameters' length of straight pipe holds very well over the whole region of turbulent flow, the resulting correction is far too high in the region of viscous flow, dropping to as low as two or three diameters for very viscous liquids in small pipes.

A fermentation process for the production of acetone, alcohol and volatile acids from corn cobs: W. H. PETERSON and E. B. FRED. Corn cobs are a possible raw material for the production of acetone, ethyl alcohol, formic acid and acetic acid. These products are obtained by fermenting a sirup which is made from corn cobs by hydrolysis with dilute sulfuric acid and contains chiefly xylose. This crude xylose sirup is fermented by *Bacillus acetoethylicum* under the proper conditions of nitrogen, and phosphate supply and hydrogen ion reaction. A continuous fermentation is maintained by filling the container with cinders to which the bacteria may attach themselves. The fermented solution is removed and a new sugar solution added without disturbing the bacteria. Under these conditions the fermentation is rapid and vigorous. The yield of products is 2.7 lbs. of acetone, 6.8 lbs. of alcohol and 3.4 lbs. of acid per 100 lbs. of corn cobs.

A new method of preparing sulphuric acid: P. C. HAESELER. Instead of oxidizing SO_2 with the oxide of nitrogen, selenium dioxide is used according to the equation: $2SO_2 + H_2O + H_2SeO_3 = 2H_2SO_4 + Se$. The selenium is filtered and reoxidized. A 50 per cent sulphuric acid free of selenium can thus be obtained without pressure. Anode slimes and other impure selenium sources can be used for the source of selenium, as roasting the same will yield an oxide sufficiently pure for the above reaction.

Corrosion under oil films and the protective action of certain colloidal solutions: WILBERT J. HUFF. An investigation by the writer in the research laboratories of the Bureau of Mines on the subject of corrosion beneath oil films caused by water soluble salts from perspiration residues, sea sprays, and certain manufacturing operations. Preliminary treatment with water, followed by a suitable emulsion, and finally by oil is recommended for inaccessible surfaces. Experiments are given to show the valuable anti-corrosive property of certain soap emulsions, and some of the conditions under which this protective property fails. The mechanism of the corrosion and protection is discussed briefly.

On the dehydration of tar and other organic emulsions: WILBERT J. HUFF. A note discussing some of the methods for the dehydration of tar and similar emulsions, pointing out a few advantages and disadvantages of each, together with a description of a method suggested by the

author and now used in the laboratories of The Koppers Company. The tar is simultaneously heated from above and cooled by a jacket of liquid water about and below. The jacket water is allowed to fall by evaporation, gradually bringing more and more tar into the heated zone. The manipulation is so simple the author finds it difficult to believe that the method has not been used before, but if so is unaware of such use. The method permits the simultaneous approximate determination of light oil and water, requires no new apparatus and practically no attention, and handles efficiently very stiff tars and tars of high water content.

The arc rupture of liquid dielectrics: C. J. RODMAN. Various organic liquid dielectrics were subjected to high frequency arcing. Finely divided, highly non-conducting amorphous carbon, saturated and unsaturated hydrocarbons lower in the series, and a number of gases were obtained. These gases consisted chiefly of hydrogen and unsaturates with small amounts of carbon monoxide, carbon dioxide, methane and nitrogen. With an increase in molecular weight a slight decrease in gas evolution per kilowatt seconds of arc rupture was noted. With an increase of halogenation a corresponding decrease in gas evolution per kilowatt seconds arc rupture is noted. Paraffine oils give approximately 60 c.c. gas per kilowatt seconds. The liquid dielectrics are apparently broken down by a temperature pressure effect of very short duration, rather than by sympathetic vibration and rearrangement of the compounds by high frequency alone. Direct application of this data is found in the use of compounded liquid dielectrics for transformers, circuit breakers and fuses.

The effects of waterproofing materials upon the tensile strength of cotton yarn: H. P. HOLMAN and T. D. JARRELL. Two sizes of cotton yarn used in the manufacture of high grade cotton ducks, after treatment with numerous waterproofing materials including commercial preparations, individual substances and formulas developed in the laboratory, were exposed to the weather for one year to show the effects on tensile strength. The tensile strength of the treated yarn after one year's exposure was in most cases greater than the strength of the untreated yarn after one year's exposure.

Special order on world's standardization: E. C. BINGHAM, *chairman*. The attitude of the manufacturer of reagent chemicals toward world standardization. The attitude of the dealers in chemicals. The attitude of the university users of chemicals. The attitude of the technical users of chemicals. The attitude of Great Britain and Canada toward world standardization. The attitude of the federal government. Discussion led by CHARLES L. REESE, W. A. NOYES, B. L. MURRAY, R. F. RUTTAN, H. D. HUBBARD and others.

The nature of acid mine water from coal mines and the determination of acidity: W. A. SELVIG and W. C. RATCLIFF. Water from coal mines is usually decidedly acid in character containing free sulphuric acid and ferrous, ferric and aluminum sulphates in addition to sulphates of calcium, magnesium, sodium and potassium together with silica and usually some chlorides. On standing, dilution, aeration or warming insoluble iron compounds tend to precipitate. The direct titration of free sulphuric acid of mine water with standard alkali solutions in the presence of methyl orange gives results much too high. Methods of accurate determination of contents of mine water are given.

Tests of the iodine pentoxide indicator for carbon monoxide: S. H. KATZ and J. J. BLOOMFIELD. The iodine pentoxide or "hoolamite" indicator for carbon monoxide is a small, rugged, portable instrument for quickly and easily indicating the presence of carbon monoxide and estimating its concentration. Commericial instruments were tested for sensitivity and accuracy. Results showed that the instrument gives positively indications with .07 per cent. or more carbon monoxide in air. With .15 per cent. carbon monoxide in air, determinations ranged from .10 to .23 per cent. with an average of .16. With higher concentrations, the variations were proportionally about the same. Fresh activated charcoal removes the following gases that tend to give interference: acetylene, ammonia, benzene, ether, ethylene, gasoline, hydrogen chloride, hydrogen sulphide, natural gas containing members higher than methane, and water. The following gases do not interfere: carbon dioxide, carbon tetrachloride, chlorine, methane, nitrogen peroxide, phosgene, and sulfur dioxide. Determinations are made in less than one minute and no skill is required. The instrument should prove valuable in testing air in mine rescue and recovery operations around blast furnaces, gas producers, water gas plants, flue gases and other places where carbon monoxide occurs.

The Berrigan filter (By title): MR. STARK.

CHARLES L. PARSONS,
Secretary