the known morphologic features of cell differentiation, it is not impossible that one and the same molecule whether falling in the category of proanlagen nutritive or enzymatic substance might, regardless of the oxidative or reductive changes incident to its elaboration, show the same capacity of absorption of energy in the two-cell stage as in the gastrula no neural-plate stages. A constant and uniform alteration of this molecule might be assumed to lead to a correspondingly constant and uniform embryological result. To the mind of the author, however, this assumption appears less probable than the hypothesis that certain protoplasmic substances maintain a constant structure, both physical and chemical, during the early stages of ontogeny. It argues equally well for the results produced whether we determine the nature of this constant content to be nutritive or enzyme, since it is conceivable that the deprivation of the enzymes of the substances out of which the morphological structures of differentiation are formed would lead to the same developmental result as the inhibitive effect of energy acting upon the ferments themselves. The presence of retardation effects is well attested both by this and by the earlier experiment and might well be accounted for on these grounds.

It is significant that in these specimens there is an absence of evidence pointing towards the destruction either of protoplasmic or of nuclear material. A more severe degree of injury brought about by the use of a greater amount of energy was evident through the presence of both protoplasmic and nuclear detritus. Furthermore, it must be pointed out that the change brought about is not incompatible with the vitality of the cells. There appears to have been suspended apparently the function of but one physiological factor of cell development, that of differentiation, unattended by any morphologic indication of destruction. The precise nature and location of this alteration, if morphologic, can not at present be identified.

W. M. Baldwin

Union University Medical College,
Albany, N. Y.

THE AMERICAN CHEMICAL SOCIETY. V

DIVISION OF INDUSTRIAL CHEMISTS AND CHEMICAL ENGINEERS

H. D. Batchelor, *chairman*

H. E. Howe, *secretary*

The symposium on cellulose chemistry attracted considerable attention and it was voted to hold a second symposium at the time of the autumn meeting in Chicago. The purpose of these symposia is to determine whether the formation of a section of Cellulose Chemistry within the society is feasible, some seventy-five members having expressed themselves in favor of such a project in discussing the matter by correspondence. The question of specifications for reagent chemicals and the standardization of laboratory apparatus and instruments brought out a number of valuable contributions, both from manufacturers and consumers, indicating willingness on the part of all concerned to cooperate in bringing about the standardization which is recognized as necessary. The subject of stimulating research in pure and applied chemistry and devising an incentive to such research gave rise to a lengthy discussion in which the economic status of the chemist was brought in. The present situation with reference to professors and instructors was discussed at length, involving the conditions for research in the various institutions and what might be done toward improving circumstances. The result of Dr. Comey's investigation would seem to indicate that at present the chemist is being as well paid for his services on the average as are the members of any of the other professions and that those in responsible positions in industry have shown a remarkable advance in earning power during the last few years. At the September meeting a symposium on the conservation and utilization of fuel will be held in addition to the symposium on cellulose chemistry and general papers.

Mechanism of the reactions of cellulose: Jessie E. Minor. The charge upon the cellulose is the result of the selective adsorption of the ions of an electrolyte by means of the residual valence which certain atoms or groups of atoms upon the surface of the colloid are capable of exerting. The subsequent swelling of a colloid in the presence of acids and bases is due to the absorption of water by the colloid as a result of a dialyzing or a repulsive force associated with the presence of the electrolyte ion. The hydration of cellulose is due to the swelling of the colloidal cellulose which has received an electrolytic charge from the hydroxyl ions in the water in which it is immersed. The hydrolysis is the direct result of the presence of the electrolyte ions whose primary effect had been hydration. The formation of oxycellulose is probably preceded by the hydrolysis of the cellulose whereby the CO group is rendered more attackable for the oxygen. The solution by zinc chloride is due to the peptization of the cellulose by the adsorbed ions with the formation of a viscous emulsion. The union between cellulose and dye is due primarily to adsorption.

The determination of cellulose in woods: S. A. MAHOOD. A uniform size of particle appears to be essential if comparable results are to be obtained in the determination of cellulose in woods. Material which passes an 80-mesh standard sieve but is retained on a 100-mesh sieve has been found to be most satisfactory from the standpoint of both yield and manipulation. Material obtained by a single mechanical process of disintegration may give a sample on sifting which is not representative. To avoid this a combination of two processes, sawing and grinding, has been used. The apparatus recommended by Sieber and Walter for use in chlorination appears to give a lower yield of cellulose than the original Cross and Bevan method probably because of the temperature at which chlorination takes place.

Nitrocellulose from wood pulp: R. G. WOODBRIDGE, JR. Due to shortage of cotton, Germany was obliged early in the world war to use wood cellulose in place of cotton for making smokeless powder. Up to about July, 1918, it was not anticipated that any wood cellulose would be required in the U. S. in spite of the enormous production of smokeless powder proposed for the balance of 1918 and for the year 1919. However, the shortage in the cotton crop, due to the drought in the summer of 1918, would have made it necessary to have supplemented the short-fibered cotton by wood pulp had the war continued. This emergency had been foreseen and experiments had been in progress for several years on the question of nitrating wood cellulose for smokeless powder manufacture. These experiments showed that a mixture of cotton and wood pulp containing up to 50 per cent. of the latter could be nitrated, purified and made into smokeless powder without any important change in equipment, with no serious loss in production, and with no change in the quality of the smokeless powder.

Notes on the manufacture of nitrocellulose: J. O. SMALL and C. A. HIGGIN. In selecting a cellulose to be used for nitrating, attention should be given to both its chemical and physical properties. The biological character of the crude fiber and its purification are the chief factors influencing the chemical properties of a cellulose, while the physical properties comprise cleanliness, color and type of fiber. From the chemical analysis of a cellulose much may be learned concerning previous treatments and its subsequent behavior when nitrated. The most important tests are (1) solubility in sodium or potassium hydroxide, (2) furfural content, (3) ether-extractive matter. Nitrocellulose for explosives must pass rigid stability tests. Purification treatments of long duration are often necessary. Since the cotton fiber is hollow, pulping is necessary to remove the last traces of acid, while alcohol dehydration improves stability by the solution of the lower nitrated, unstable types. In the non-explosive arts the most common effects of instability are the formation of a brittle film, discoloration of dyes and corrosion in metal lacquers. By the use of alkaline treatments following an acid hydrolysis, better stability may be obtained without impairing the appearance of the nitrocellulose solution.

Certain aspects of the chemistry of cellulose acetate from the colloidal viewpoint: G. J. ESSELEN. Considering cellulose as a colloidal aggregate, certain of the changes involved in the preparation and use of cellulose acetate are considered from the colloidal viewpoint. With these considerations as a basis, a theory is offered to explain a number of previously unconnected facts regarding the solubility of cellulose acetate.

Projects of the preliminary committee on American cotton research: H. E. HOWE.

Is it advisable to form a section of cellulose chemistry? JASPER E. CRANE.

The determination of cellulose in woods: L. F. HAWLEY. A uniform size of particle appears to be essential if comparable results are to be obtained in the determination of cellulose in woods. Material which passes an 80-mesh standard sieve but is retained on a 100-mesh sieve has been found to be most satisfactory from the standpoint of both yield and manipulation. Material obtained by a single mechanical process of disintegration may give a sample on sifting which is not representative. To avoid this a combination of two processes, sawing and grinding, has been used. The apparatus recommended by Sieber and Walter for use in chlorination appears to give a lower yield of cellulose than the original Cross and Bevan method probably because of the temperature at which chlorination takes place.

Cellulose phthalate; its preparation and properties: H. A. Levey.

The effect of impurities on the metallurgy of tungsten: Clarence W. Botka. A study was made of the effect of such oxides as those of iron, cobalt, calcium, sodium, aluminum, magnesium, thorium and the rare earths on the density of ignited tungsten oxide and of the tungsten metal powder resulting from its reduction in hydrogen. Further observation was made of the effect of these impurities upon the grain size of sintered tungsten ingots. In general it may be said that iron and cobalt render the metal exceedingly hard and difficult to work, and produce an exaggerated grain growth. Such impurities as the oxides of calcium, aluminum, magnesium, etc., tend to block grain growth during sintering and in some instances make it necessary to prolong this operation.

The separation and examination of the isomers of xylene: W. D. Turner and K. K. Kershner. Samples of xylene, obtained through the kindness of the Laclede Gas Light Co. were submitted to a series of fractional sulphonations and crystallizations of various sulphonic salts, according to a scheme suggested by the research department of the Eastman Kodak Co. The processes were first carried out in glassware after which the resulting modifications were tried in small size industrial apparatus. The process as applied consisted essentially of four successive sulphonations, the oil remaining unaffected holding the para-xylene. This was sulphonated with fuming sulphuric acid and converted to the barium salt for recrystallization after which it yielded pure para-xylene by hydrolysis. The ortho- and meta-sulphonic acids were converted to the sodium salts which were separated by fractional crystallization. Subsequent hydrolysis yielded pure ortho- and meta-xylenes.

The preparation of furfural from corn cobs: H. L. Dunlap and V. K. Fischlowitz. Varying concentrations of sulfuric acid, from 5.8 normal to 1 normal, were used to treat the material in a thirty-five gallon enameled steam jacketed kettle. Three normal sulfuric acid was found to be best. Concentrations beyond this decomposes some of the furfural thus cutting down the yield. When rapid steam distillation was used, the time for refluxing is about two hours. The more rapid the steam distillation the better, as the furfural will be carried over in larger quantities for the distillate collected. If the distillation is too long drawn out, poorer yields will result owing to decomposition. The liquid in the kettle must not be allowed to concentrate too rapidly in the beginning of the distillation. Sulfuric acid does not serve as well as hydrochloric acid for the condensation of the pentoses, but it permits of the use of condensers other than of glass. Benzene can be used as a solvent in place of the more expensive and more highly volatile ether.

The carbonization of Missouri cannel coals: H. L. Dunlap and K. K. Kerschner. Five different cannel coals were subjected to destructive distillation in a gas-fired horizontal retort and the results compared with a bituminous coal coked under the same conditions. Both the oils and gases collected at different stages of the carbonization were examined. Different cannel coals show a wide variation in the yield of distillation products. The decomposition temperature for cannel coals is much lower than that of bituminous coals. The oils from cannel coals have a low specific gravity and consist chiefly of paraffin hydrocarbons. These oils resemble the oils obtained by low-temperature carbonization of bituminous coals. Cannel coals yield a larger quantity of gas than bituminous coals and this gas has a high calorific and illuminating value. Again, this is what is found in the coking bituminous coals at a low temperature. With the removal of the sulfur compounds, cannel coal gas would be a valuable illuminating gas. Cannel coals yield little ammonia due to the low temperature of carbonization. Only two of the coals examined gave a coke of any commercial value. Again, these coals would not be a source for benzene and toluene unless coked at a higher temperature than used in these tests.

(*To be continued*)

Charles L. Parsons,
Secretary

SCIENCE

A Weekly Journal devoted to the Advancement of Science, publishing the official notices and proceedings of the American Association for the Advancement of Science

Published every Friday by

THE SCIENCE PRESS

LANCASTER, PA. GARRISON, N. Y.

NEW YORK, N. Y.

Entered in the post-office at Lancaster, Pa., as second class matter