

action proceeded its rate diminished but less rapidly the greater the amount of starch present.

4. Working with 1 per cent. starch, however favorable the conditions of salt and alkalinity and however large the amount of enzyme, the hydrolysis tended to come to equilibrium when the weight of maltose reached about 85 per cent. of the initial weight of starch.

5. In the presence of more than the optimum amount of alkali the point of equilibrium was approximately the same if sufficient time was allowed and fresh enzyme added during the reaction.

6. The data obtained have been applied in a method of determining and expressing diastatic power based upon the optimum conditions of salt and alkalinity as found for pancreatin and the quantitative relation between the amount of amylase and the reducing sugar it produces as shown by the velocity curve. The description of this method has been given in the preceding paper.

7. Between 20° and 40° the action of pancreatic amylase (properly activated by sodium chloride and sodium phosphate) showed a temperature coefficient approximating van't Hoff's rule for normal chemical reactions, since it nearly doubles for a rise of 10°.

8. Tested in solutions of varying alkalinity containing sodium chloride and sodium hydroxide or sodium phosphate, asparagine showed little, if any, effect not explainable by its influence upon the alkalinity of the solution.

NOTE.

Note: Preparation of ortho- and para-Nitrophenols.—The preparation of the nitrophenols as ordinarily carried out is accompanied by the production of much tar and is a somewhat unpleasant operation. The yield of the para compound is small, 50 grams of phenol giving according to Gattermann only from 5 to 10 grams of para-nitrophenol. Inexperienced operators often get no more than one or two grams of the compound, if any at all. This justifies the publication of the improvement recommended in the present note.

The production of tar is completely avoided and a yield of 18 per cent. of para-nitrophenol (13 grams from 50 grams of phenol) is obtained uniformly, *if the nitric acid is vigorously stirred during the addition to it of the phenol.* The results given below were obtained by carrying out the operation as follows: A solution of 80 grams sodium nitrate and 100 grams of strong sulphuric acid in 200 cc. of water was energetically stirred with the aid of a small water motor and kept at about 25°. To this was added drop by drop, at the rate of about 30 or 35 drops a minute, out of a separatory funnel, a solution of 50 grams crystallized phenol in 5 grams alcohol. The stirring was continued for about one-half hour

after the addition of the phenol was completed, the mixture was allowed to stand for an hour and one-half longer, and then treated, as usual, with double its volume of water. The heavy oil that separated out was reddish-brown in color, but invariably transparent and free from sticky or tarry ingredients. The oil was washed two or three times with water and subjected to distillation with steam. The distillate yielded slightly less than 30 grams of a beautiful ortho-nitrophenol (the quantity obtained by Gattermann). The residue was evaporated to less than half its volume, boiled with 20 grams of bone-black, filtered hot, and allowed to crystallize in the cold. Two consecutive operations yielded, respectively, 13.2 and 12.9 grams of pure para-nitrophenol, which is about 18 per cent. of the theoretical yield from 50 grams of phenol. A nitration similarly carried out, but with the temperature kept, not at 25° but at 4°, resulted in 12.8 grams of para-nitrophenol. Below 4° the nitration refused to take place, altogether. Further, a nitration carefully carried out at 50° yielded 12.5 grams of para-nitrophenol and slightly less of the ortho compound than is usually obtained at lower temperatures.

The temperature thus seems to have but little influence on the yield of both ortho- and para-nitrophenol, and the ordinary temperature of the laboratory is but slightly more propitious than either higher or lower temperatures. Far more important are the vigorous stirring of the solution during nitration and the very gradual addition of the phenol.

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NEW BOOKS.

Radiochemistry. By A. T. CAMERON, M.A., B.Sc., Lecturer in Physiological Chemistry, University of Manitoba. London: J. M. Dent & Sons, Limited. 1910. viii + 174 pp. Price 2 s. 6d. net.

The book, the contents of which are based largely on three articles dealing with the "Transformation of Elements" which appeared in *Science Progress* in 1908, treats selected topics of the subject of radioactivity from the chemical point of view. The physical side is sketched only in sufficient outline to enable the reader who has some knowledge of physics and chemistry to appreciate the chemical results.

Those chapters which recount the properties and chemical behavior of radium emanation are of greatest interest; part of the results represent the author's own work with Sir William Ramsay. Radium emanation is now known in the solid and liquid as well as in the gaseous state. In the latter form it is produced to the extent of 0.1 cm. per day per gram of radium. The liquid emanation has a density of about 5; it boils at