reds, blues and yellows. Most other colors are mixtures and combinations of these three colors. The foregoing tables give the results obtained on three vegetable colors and three coal tar colors, having similar shades and having exceptional great color intensities for the classes of colors they represent.

Examination of these tables shows that the use of miscible solvents like methyl and ethyl alcohols and acetone are of no value for extraction purposes. Solvents of an acid like character (ethyl acetate) are not suitable as the results obtained are misleading, due to the effect of the solvent on the color.

The solubilities of many colors in petroleum ether, ether, carbon disulphide, carbon tetrachloride and chloroform is so slight, that these solvents are very suitable for preliminary extraction of food products thereby extracting oils and fats, before making dyeing tests to separate the colors. Care must be exercised, as many colors are soluble in fats or oils and are liable to be extracted in such preliminary treatment. Examination of the fats or oils will show whether any color has been extracted with these.

Conclusions drawn from a very large number of solubility and extraction tests, extending over a long period of time, are that the colors extracted or dissolved by many solvents under varying conditions from neutral, acid or alkaline solutions, give no conclusive data for deciding upon the character or class of the colors themselves. The differences in solubility and in extractive values of vegetable colors compared with coal tar colors, are no greater, nor less, than the differences found between the various colors themselves, belonging to the same class of colors.

Comparative color intensities were also determined and it was found that only a very limited number of vegetable colors, had a color intensity equal to one-fourth that of a corresponding shade of coal tar color and that the largest number of vegetable colors had one-tenth or less color intensity, than the corresponding coal tar color of similar shade.

The colors used were supplied to me by Messrs. H. Kohnstamm & Co., to whom I wish to express my thanks for assistance rendered.

903 POSTAL TEL. BLDG., CHICAGO.

[FROM THE LABORATORY OF PHYSIOLOGICAL CHEMISTRY OF THE DEPARTMENT OF MEDICINE OF THE UNIVERSITY OF PENNSYLVANIA.]

ON THE DIGESTION OF URINE IN THE DETERMINATION OF NITROGEN BY THE KJELDAHL METHOD.

BY P. B. HAWK.

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Having made use, in several metabolism experiments, of various modi-

fications of the Kjeldahl method for the determination of nitrogen, I concluded that it would be of interest to determine whether, under the same conditions, there was any reason for preferring any particular one of these modifications used by me, in different laboratories, with satisfactory results, in the determination of the nitrogen content of the urine. Each of the modifications had been carefully checked at the time of using, but obviously, of course, I had never made simultaneous determinations of nitrogen upon the same sample of urine by means of each of the modifications. It was also desired, in this connection, to secure data regarding the rapidity of digestion under various conditions. The modifications of the Kjeldahl method which have been used by me in the determination of nitrogen in the urine, are those which entail the following procedures as to preliminary digestion of the specimen:

Method I.—Five cubic centimeters of urine were treated with 20 cc. of concentrated sulphuric acid in a Kjeldahl digestion-distillation flask, 0.2 g. of powdered cupric sulphate added and the mixture boiled until the digestion was complete. From the data which are summarized on the following page it will be seen that this process of digestion was completed in *thirty minutes*, provided care was taken to see that the Bunsen burners were in proper condition to produce the maximum amount of heat. The usual method of distillation was employed.

Method II.—Exactly the same as the first method, given above, except that 0.2, 0.5 or 0.7 g. of mercury was used in the digestion instead of 0.2 g. of cupric sulphate. This procedure was accompanied, of course, by the use of potassium sulphide in connection with the concentrated alkali in the final distillation.

Method III.—Exactly the same as the second method, given above, except that 5 g. of potassium sulphate were added to the digestion mixture after the sulphuric acid had reached the boiling-point and the flask had been cooled somewhat.

Experimental Data.

In every instance, 20 cc. of concentrated sulphuric acid and 5 cc. of the same urine sample were used in the digestion. The final distillations were always conducted under like conditions as to *length of the distillation period* and *volume of the distillate*. Special attention was given the Bunsen burners of the digestion apparatus in order to secure the maximum amount of heat. The results of the tests are given in tabular form below:

Determination of Total Nitrogen in a 24-hour Sample of Urine, 20 cc. of Concentrated Sulphuric Acid Used in Each Case. The Results Give the Number of Grams of Nitrogen in 1200 cc. of Urine.

	0.2 gram		0.4 gram		1 gram	
	Digested 30 minutes	Digested 90 minutes	Digested 30 minutes	Digested 90 minutes	Digested 30 minutes	Digested 90 minutes
Powdered $CuSO_4$	14.33	14.34	14.25	14.29	13.82	13.79
	14.28	14.36	14.22	14.21	13.75	13.87
	14.35	14.37	....	....	13.92	13.83
	14.33	14.31	....	....	13.80	....
	....	14.28	....	....	....	....
$CuSO_4$ solution	14.34	14.30	14.28	14.27	....	....
	14.31	14.35	14.31	14.25	....	....

	0.2 gram		0.5 gram		0.7 gram	
	Digested 30 minutes	Digested 90 minutes	Digested 30 minutes	Digested 90 minutes	Digested 30 minutes	Digested 90 minutes
Potassium sulphate (5 grams) and mercury	14.31	14.30	14.30	14.35	14.32	14.35
	14.22	14.33	14.35	14.26	14.30	14.29
	....	14.27	14.35	14.32	14.27	....
	....	14.31	14.21	....	....	....
	....	...	14.27	....	....	....
Mercury	14.27	14.20	14.24	14.30	14.26	14.24
	14.29	14.23	....	....	....	....
	....	14.25	....	....	....	....

NOTE.—Tests made with a digestion period of 20 minutes, gave in every instance, much lower results than those tabulated above.

Conclusions.

1. Method I, as outlined above, is as satisfactory as any of those tried, for the digestion procedure in the determination of nitrogen in the urine. This method entails the use of 0.2 g. of powdered cupric sulphate in the digestion process. It is no more accurate than methods II and III as outlined, but it is preferred because of the fact that the method includes the use of fewer reagents and therefore allows of the saving of considerable time, particularly where large numbers of determinations are made, as is frequently the case in extensive metabolism studies.

2. In the case of urine, the digestion is complete in thirty minutes, when either of the methods, as outlined, is used. However, when time permits, it is advisable to continue the digestion for a somewhat longer period.

3. The presence of an excess of cupric sulphate in the digestion mixture occasions a loss of nitrogen, the data showing a somewhat higher percentage of nitrogen when 0.2 g. of cupric sulphate was used, than that obtained when the amount of cupric sulphate was raised to one gram.

4. Cupric sulphate may be used to equal advantage in powdered form or in solution, the only point to be borne in mind in this connection

being that the most satisfactory amount to add, whether in powder or in solution, is 0.2 g.

5. Urine cannot be satisfactorily digested, by any of the means mentioned in this article, in less than thirty minutes.

NEW BOOKS.

PRACTICAL TEST-BOOK OF CHEMISTRY. BY JOHN DABNEY PALMER., M.A., M.D. New York: John Wiley & Sons. Price $1.00.

This handy little volume of 190 pages will be useful to pharmacists and practising physicians. While the book does not by any means contain enough material to justify the claim made in the preface of serving as a "*safe guide for testing any substance presented for examination*" it will, nevertheless, be helpful to the analytical chemist in cases where the substance under examination happens to be treated by the author. The book is made up of two parts: Specific Tests and Tests for Purity. The first part contains identification reactions for many of the most important alkaloids, glucosides, bitter principles and synthetic remedies together with a few inorganic substances, like alum and ammonia. The second part contains directions for detecting adulterations in some definite compounds, like alcohol, chloroform, etc., as also in many other substances used either as foods, medicines or in the arts. A list of principal reagents employed is given in the book along with their methods of preparation. The book is supplied with an exhaustive table of contents and an alphabetical index which is very incomplete. The choice of material is not very evident. Many rare substances are included while substances of frequent occurrence are left out. Alcohol and chloroform are treated, but ether and benzene are not mentioned. Tests for butter, sausage, triptopine and several other rare alkaloids are given, but cheese, lemon oil and other important substances are left out. Borax and alum receive notice, but nothing is said about washing soda, potassium iodide or bromide. The specific tests are, as a rule, quite simple and easily carried out; in fact, the author purposely avoids complicated operations or special apparatus. Neither the polariscope nor the refractometer are used in the indentification tests. Even the separatory funnel is replaced by a simple glass tumbler. The wisdom of such simplifications may well be questioned. The tests for some substances are quite exhaustive, while for others the tests are so meagre that even melting points are not stated. The directions given as specific tests will usually be found sufficient for the identification of pure substances, but those under the name of tests for purity will in many cases show only adulterations of the crudest kind. Phenacetin is treated in two different places, on pages 7 and 98, giving two sets of specific tests but no melting point is given in either place.

H. M. GORDIN.