

and others can only be settled by carrying out basal metabolism and dietary studies simultaneously on groups of individuals at different levels of nutrition.

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¹ Mason and Benedict, *Indian J. Med. Res.*, 1931, 19, 75.

² Abderhalden and Buadze; *Z. Physiol. Chem.*, 1930, 189, 65.

³ Lusk, "Science of Nutrition," Saunders, 1928, 168.

On the Absorption Spectra of the Halides of Some Elements of the Second Group :

$CdCl_2$; $CdBr_2$; CdI_2 ; $ZnCl_2$; $ZnBr_2$ and $SrCl_2$.

The absorption spectra of the above halides of the elements of the second group were studied by the same method of experimental procedure as that adopted by R. Samuel¹ and the regions of the maxima of absorption obtained by plotting the values of log K against wave-length. The salts are very hygroscopic and the preparation of solution offered some difficulty as much heat was developed. In the case of $ZnCl_2$ and $ZnBr_2$ a lower concentration could not be prepared as the addition of water precipitated the

Salts	Maxima of Absorption Wave-length in μ	Log K values
$CdCl_2$	260 -0.76
$CdBr_2$	273 -0.06
CdI_2	No maxima of absorption	
$ZnCl_2$	338-300 (5M)	.. 255 (5M strength) -1.48 -0.28
		255-227 (M/2 ,,)
$ZnBr_2$	308.. 276	.. -0.28 -0.08
$SrCl_2$	420 .. 346..312	-1.26 -0.96 -0.69

salt in a form of colloidal solution which dissolved on the addition of a little HCl and HBr respectively showing hydrolysis. The curve for $ZnCl_2$ indicates that it does not obey Beer's law.

The above table shows the wave-length of the maxima of absorption of different salts with their log K values.

Details will be published elsewhere.

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¹ *Zeit. f. Phys.* 1931, 70, 43.

A New Device for the Insect Transmission of Spike Disease of Sandal.

In the course of experiments on the insect transmission of the spike disease of sandal, we experienced a serious shortage of spiked plants having plenty of diseased foliage to serve as the source of infection for the vectors. This difficulty was overcome by conducting the experiments with spiked plants growing under natural conditions in an artificially raised plantation. The plants selected for the purpose offered a branch in a suitably low and oriented position so that

the diseased branch could be inserted into the experimental cage, thus providing the source



of infective material. The cage receives also the healthy sandal plant growing in a pot

(Fig.). This method has several advantages over the usual method of providing spiked plants in pots which do not survive the feeding by insects. The diseased branch, on the other hand, being a part of the big plant, is capable of withstanding the attack of the vectors more successfully than the small independent plant with an equivalent amount of branch and foliage. Often, it is advantageous to decapitate the other branches and divert the entire nutriment available, for the vigorous growth of the diseased branch utilised for the experiment. This device has successfully solved the problem of the supply of spiked plants for our transmission experiments and it is hoped that this method may find useful application in the investigation of the other allied diseases.

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Oxidative Digestion of Organic Nitrogen.

It was shown in a previous communication¹ that nitrogen in soils and biological materials can be estimated by a process of oxidative digestion. The present note relates to (a) the nature of the products formed under such conditions and (b) an improved procedure for their inclusion in the estimate of total nitrogen.

The observations may be summarised as follows:—(1) When an aqueous suspension (or solution) of soil or other biological material is heated slowly with dichromate (or chromic anhydride) and sulphuric acid as in the usual procedure for the wet combustion of carbon, there is invariably some loss of nitrogen, the extent of such loss being inversely related to the rate of heating. The mechanism of this loss is still not clear though there is some evidence to show that ammonium dichromate, which is formed as an intermediate product, may undergo slight decomposition, yielding elemental nitrogen. The loss can be avoided, however, by first heating the material to be digested with water and sulphuric acid and then adding the oxidising agent to the boiling (or nearly boiling) mixture. (2) Small quantities of nitric acid are formed during the digestion. This is supported by the

independent observations of Narasimha-charya.² The quantities are ordinarily too small to appreciably affect the estimate of total nitrogen even if the digest is boiled without condensing the ensuing vapours. On the other hand, the original material itself may contain useful amounts of nitrate which may be lost if proper precautions are not taken. The use of water or air-cooled condenser, as suggested by Narayanayya and Subrahmanyam (*loc. cit.*) helps to retain all the nitrogen in this form. Subsequent reduction of the digest with zinc or reduced iron in acid medium or Devarda's alloy in alkaline medium helps to include all the nitrate in the estimate of total nitrogen. More recently evidence has been adduced to show that even added nitrates can be retained in the digest and accurately estimated by adopting the above procedure. (3) It has already been shown (Narayanayya and Subrahmanyam, *loc. cit.*) that a part of the nitrogen is always retained in the digest and is not released by mere distillation with alkali. Further evidence has been obtained to show that the major part of this nitrogen is present in combination with the chromium in solution and is released on treating the digest with such reagents as are usually employed for reducing dichromate. The nature of the related compound (or compounds) is still obscure. (4) No information is available regarding the mode of association between nitrogen and the insoluble precipitate formed—especially in the case of soil—during digestion. It may nevertheless be mentioned that any nitrogen which may be present in that form is also included in the estimate of total nitrogen by treatment with reducing agents followed by distillation with alkali.

It was suggested by Narayanayya and Subrahmanyam (*loc. cit.*) that the total nitrogen in the digest can be estimated by boiling with zinc followed by distillation with excess of alkali. Unfortunately, all preparations of zinc (including some of the purest specimens) contain nitrogen. In some cases, the nitrogen content may be as high as that of the material to be digested. Reduced iron also contains nitrogen, though the latter is partly removed by pre-treatment with alkali. Since the major part of the zinc or iron is required for the reduction of unused chromic acid, it was considered desirable to use other reducing agents for that purpose. Among the various re-agents