

The first of these equations corresponds to the special problem of Ekman, whose solution is represented by Fig. 25, and the other corresponds to his slope current represented in Fig. 10, except that it has to be multiplied by the factor

$$ia(d-h) + \frac{g}{v} \sin \gamma_x.$$

The determination of this factor is done by Ekman in the same manner as by Nomitsu, by using the condition that the total transport of water shall be zero.

As will be seen there is no difference of principle between the solution of Ekman and that of Nomitsu, and the slight difference in the diagrams must in some way be due to inexactness in the numerical computations.

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K. Kalle. "Meereskundliche chemische Untersuchungen mit Hilfe des Zeiss'schen Pulfrich-Photometers. III. Mitteilung. Methodische Untersuchung der Phosphatgehaltsbestimmung." *Ann. d. Hydr. usw.*, LXII Jahrg. (1934), S. 65—74, 95—102. Berlin 1934.

In the two previous papers of the series (*Ann. Hydr.*, 1931, pp. 313—317; 1933, pp. 124—128.) Kalle described the Zeiss Pulfrich Photometer and its application to the colorimetric analysis of sea water. In the present work he describes an exhaustive research made with its aid to improve the accuracy of the determination of phosphate in sea water by Atkins' modification of Denigès' molybdimetric method. Certain non-standard fittings to the photometer, such as the long 25 cm. absorption tubes holding only 50 ml., supplied specially for sea water work, are described in the earlier papers.

Sea water has a higher absorption in the blue than has distilled water and the molybdate reagent tends to develop a more yellow tint in sea water. The narrow spectral range examined by the photometer has therefore special advantages and the red "S 72" light filter has been adopted.

Kalle investigated very fully the effect of varying the relative proportions of acid and molybdate in the reagent and of varying the amount of reagent added to the sample. He advises the continued use of the present acid molybdate reagent but that the amount added be halved, i. e., 1 ml. instead of 2 ml. per 100 ml. of sample. Four advantages follow, viz. (1) linear proportionality between absorption coefficient and phosphorus content, (2) higher sensitivity, (3) minimum salt error, (4) lower limits of error. Silicate (5,000 mg. Si/m.³) does not interfere. The reagent may develop yellow or blue tints in itself due to improper preparation, organic impurities in the sulphuric acid or the action of light. Detailed directions are given for overcoming these difficulties.

Addition of too much stannous chloride increases the salt error and by increasing the concentration of acid displaces the colour relations. The depth of tint is increased by adding the stannous chloride solution in two or three parts instead of all at once. This is due to the rapid oxidation of the reductant. Fifteen minutes after its addition to the sea water its strength was shown to be diminished by more than half. When standing in air the reagent loses one quarter of its strength in 10 hours and a fresh solution should be prepared within this time.

The temperature coefficient of colour development is considerable, so that standard and sample must be compared at the same temperature.

The maximum colour development is reached in ten minutes and after 25 minutes slow fading sets in. The lower limit of determination is claimed to be 0.6 mg. P per cubic metre.

The salt error amounts to -0.33% per 1% increase in salinity. Thus to obtain the true phosphate content of a sea water of 35% salinity the apparent content must be multiplied by 1.13 (compared with 1.26 by the older method). This factor applies to photometric determination with the red S 72 filter, and analysts making direct visual comparison would do well to re-determine the salt error for themselves. It should be emphasized that determinations using 1 ml. instead of 2 ml. of reagent per 100 ml. will not be comparable unless the respective salt corrections have been applied.

The work was carried out with distilled water and artificial sea water. Experiments to establish whether the results are applicable to natural sea water are in progress.

L. H. N. C.

K. Lüders. "Sediment und Strömung". Senckenbergiana, Bd. 14, Nr. 6, S. 387—90, Frankfurt a. M., 1932.

K. Lüders. "Unmittelbare Sandwanderungsmessung auf dem Meeresboden". Veröff. Inst. f. Meereskunde, N. F., A, H. 24. Berlin, 1933.

In the earlier (and shorter) of these two papers, Dr. Lüders discusses the inferences as to currents which may legitimately be drawn from the study of sediments, and contends that some workers have drawn inferences which are by no means trustworthy. He deals with various considerations needing careful weighing in this connection, and stresses the difficulty which must often arise from ignorance as to whether type and distribution of sediment is current-produced or current-modified. In the case of a river bottom, the correspondence between current and sediment observed in a few places, can afford information as to current strength at many other places. In the sea, difficulties are many. Is the area in a state of rest, being deepened, or built up? If knowledge of present-day current conditions is sought, much would depend upon knowing into which class the area falls. Moreover the current observed when studying the association between water movements and sediment might be not at all representative of the most usual state of affairs — so that the sediment sampled and studied might occur with quite other current conditions. Just what degree of importance attaches to the correspondence between large silt areas in the North Sea south of the Dogger Bank and the scheme of residual currents? Here the author is dealing with Pr atje's correlation of Böhnecke's residual current picture and his own (Pr atje's) mapping-out of the silt areas.

Residual current convergence regions are not to be regarded only as areas wherein transported silt can be deposited; they are no less areas in which pre-existing silt beds could persist. This being so, may not Schütte be right in supposing the silt areas to be relicts of muddy lagoon bottoms?

Adequate consideration should be devoted to tidal streams, upon the strength of which residual currents throw no light, and concerning which there may be no area free from strong water movements despite the apparent convergencies displayed upon residual current charts.

Lüders declares that everywhere where the sea bottom is engaged in change, the sediment does not usually furnish a correct unit of