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A METHOD OF TITRATING PHYSIOLOGICAL FLUIDS

BY

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(*Reprinted from the "Journal of Physiology,"* Vol. xl, March 19, 1910)

From
THE WELLCOME PHYSIOLOGICAL RESEARCH LABORATORIES
BROCKWELL HALL
HERNE HILL
LONDON, S.E.

Journal Physiology, Vol. XL.

[*From the Proceedings of the Physiological Society*, March 19, 1910.]

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In the process of titration the "end-point" is, theoretically speaking, a certain definite H· or OH′ ionic concentration. In practice an indicator is used to visualise this. When dealing with colourless solutions of well-dissociated acids and bases the change of H· ionic concentration as the neutralising solutions are mixed is rapid and the use of an indicator presents no difficulty.

Physiologists, however, are frequently called upon to titrate fluids which are coloured and contain feebly dissociated materials. A method of doing this is given by S. P. L. Sörensen[1] in his excellent survey of this problem. He has gone into the subject thoroughly and has prepared a number of standard mixtures the H· ionic concentration, and therefore also the OH′ ionic concentration, of which he has carefully measured by use of a hydrogen electrode. He recommends for general use, the comparison of the solution to be titrated with one of his standard mixtures, using the same indicator in each case and compensating for the colour of the fluid investigated by means of certain neutral dyes.

The modification of this method here proposed necessitates the use of a homely apparatus but does away with the tedium of matching the colours of the untitrated fluids and with the use of neutral dyes altogether. A second sample of the same fluid compensates for the colour of the solution to be titrated. The "end-point" of the titration is, as before, that correponding to the H′ concentration of a suitable mixture taken from Sörensen's tables.

Two similar glass cells are each surmounted by a Nesslerising tube and illuminated from beneath by reflection from a dull white surface. The room may be darkened. The tubes are filled as indicated in the diagram. To the tube B standard acid or alkali is added till the colours seen looking down the two tubes match. When they do so, the contents of B have the same ionic concentration as the chosen Sörensen mixture.

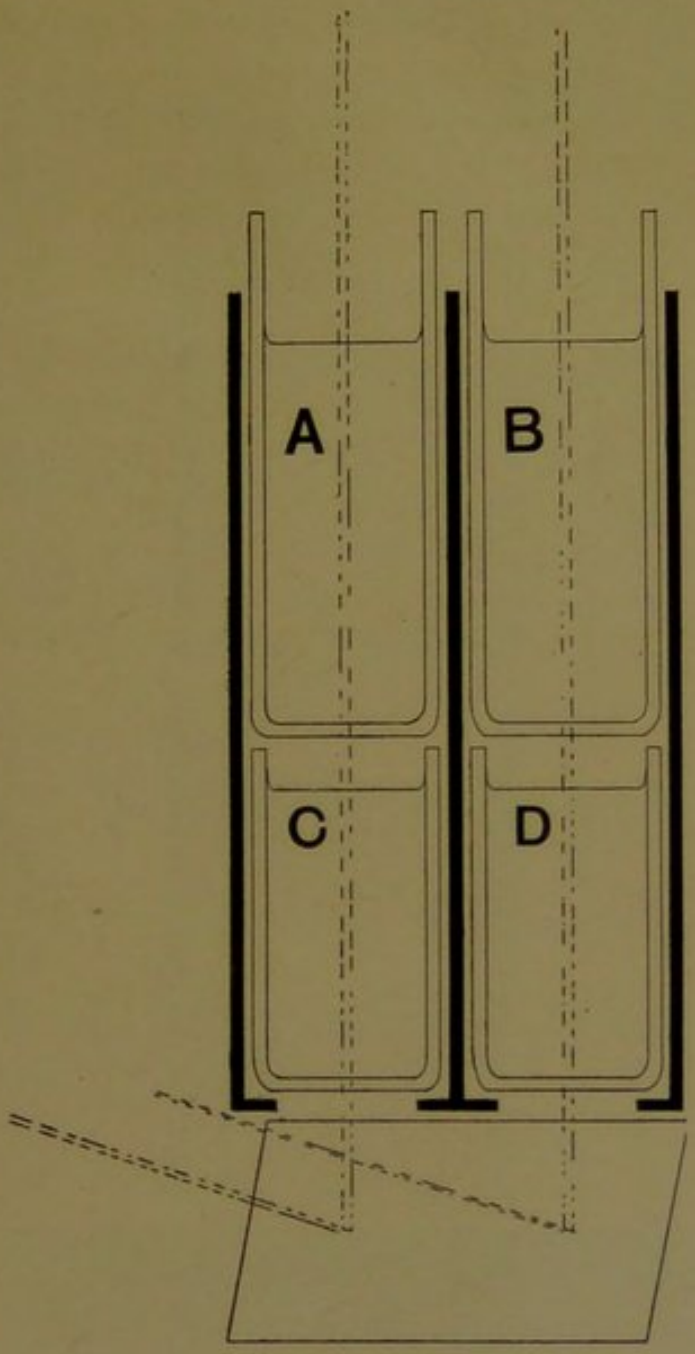
[1] S. P. L. Sörensen, *Biochem. Zeitschr.* XXI. p. 131.

The colour of the fluid titrated, the strength of the indicator solution, the colour of the illuminating light do not enter into the question, except in so far as they slightly affect the accuracy with which the "match" can be hit off. This is also facilitated by the employment of a diaphragm below each pair of tubes and a further improvement could doubtless be obtained if both beams of light were brought by prisms to one eye-piece with a divided field.

Using this apparatus the ionic concentration of a feebly acid or alkaline liquid can be measured by Sörensen's Colorimetric method by an obvious modification. The cells are arranged

C D
A B

and the Sörensen mixture in C is modified till a "match" is obtained. The $H^{\cdot}$ ionic concentration of the solution in B is then that of the Sörensen mixture in C and can be discovered from his tables.



A contains x c.cs. of the coloured sample to be titrated.

B contains x c.cs of the coloured sample to be titrated + y c.cs. of indicator solution.

C $\overline{y}$ c.cs. of indicator solution + x c.cs. Sörensen mixture.

D water.