

The findings of the histopathological sections will be reported at a future date.

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A Simple Continuous Standard for Colorimetric Determination of pH.

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Comparison of an unknown solution containing indicator with standards obtained by superimposing the extreme acid and alkaline colors of the indicator in varying proportions is used in several methods of pH determination. In the simplest of these the standards consist of a series of pairs of test tubes, one tube of each pair containing acid indicator and its mate alkaline indicator.¹ By partitioning a fixed quantity of indicator in different proportions in each pair of tubes a series of color standards is obtained whose pH values have been determined.

The mid-point of such a series is represented by a pair of tubes containing equal concentrations of the indicator. For our purposes they must also contain equal volumes. Starting with such a pair of tubes, if we add to the acid tube from a burette any volume of a solution of the indicator having a concentration twice that in the tube, and from another burette add to the alkaline tube an equal volume of water, the combined color of the tubes may be made to pass continuously through that portion of the indicator range which lies on the acid side of its mid-point. Similarly by adding indicator to the alkaline tube and water to the acid tube the other half of the range may be covered. The original mid-point pair of tubes may be titrated in this manner either to match a given unknown solution or to a color representing any desired pH. The amount of shift of the pH from the mid-point will be equal to $\log \frac{A+X}{A}$, when A is one-half of the initial volume in the mid-point tubes, and X is the burette reading. Tables or graphs giving corresponding values of pH difference and burette reading may be constructed. It is apparent that the smaller the initial volumes in the mid-point tubes the more sensitive the end-point will be in the marginal portions of the indicator range.

¹ Gillespie, L. J., *Soil Science*, 1920, **9**, 115. Clark, W. Mansfield, *The Determination of Hydrogen Ions*, Edition 1928.