

start to appear at this same concentration. It thus seems that molecules of sulphuric acid cannot appear until nearly all free water has been consumed.

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The Sodium Silicate - Hydrogen Peroxide System

THE chemistry of silicic acid in solution is rather ill-defined¹ owing to the extremely weak nature of this acid² and its tendency to polymerize^{3,4}. As there are many instances where hydrogen peroxide effectively prevents anionic polymerization^{5,6}, an attempt was made to investigate the hydrolysis of silicate ions in the presence of hydrogen peroxide by means of accurate conductivity⁷ and pH measurements. For comparison, the same technique was applied to an identical series of solutions in the absence of hydrogen peroxide. Fig. 1 shows the results of the investigation on solutions which were 0.01 M in sodium silicate and, in the case of the 'peroxidized' system, approximately 0.1 M in hydrogen peroxide; sulphuric acid was 0.498 M.

The pH curve of the system sodium silicate-water (full lines) shows two changes: a weak one on addition of 4.75 ml. sulphuric acid and a strong change on addition of 9.3 ml. acid. The former change may be due to the reaction of the dihydroxy-orthosilicate ion¹⁻³ with hydrogen ions:



The latter change denotes obviously the completion of the neutralization reaction:



the hydroxyl ions being those hydrolytically produced by sodium silicate. Corresponding changes in the conductivity curve of the same system are brought out by the interpolated point of intersection⁸ B (equation 1) and point D (equation 2) respectively. The strong pH change (equation 2) seems to mask the final decomposition of the trihydroxy-ortho-silicate ion to silicic acid, although some indication of the latter reaction is borne out by the shape of the conductivity curve near point D.

A similar picture emerges from the investigation of the sodium silicate - hydrogen peroxide system (dotted lines), with the difference that as the pH of the initial solution lies below 10.75 (owing to the consumption of hydroxyl ions by hydrogen peroxide in alkaline solution) the points A and B are absent. A comparison of the specific conductivities in the two systems for solutions containing 6-9 ml. sulphuric acid reveals the rather significant finding of higher conductivity in the 'peroxidized' system (pH 8-10) which may be attributed to the lack of polymerization of the silicate ion in this system. The suggestion is therefore made that the study of the hydrolysis of the silicate ions is rendered less complex in the presence of hydrogen peroxide.

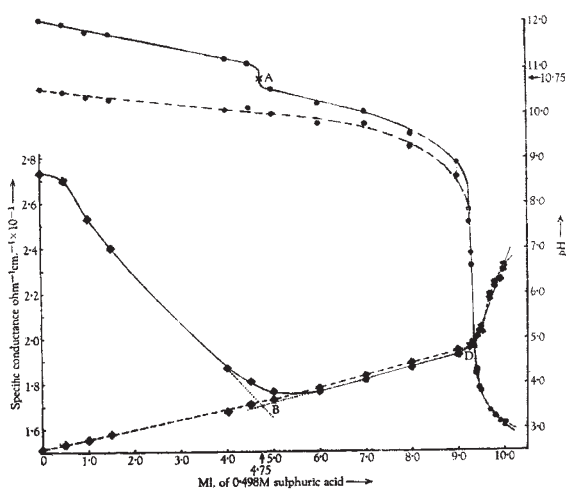


Fig. 1. Measurements of specific conductivity (◆) and pH (●) for the systems sodium silicate - hydrogen peroxide - water (dotted lines) and sodium silicate - water (full lines)

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Volatile Organic Matter in Algal Culture Media and Sea Water

DURING an investigation of the extracellular products of marine algae, in which filtered culture media were concentrated by vacuum distillation, the distillates, which had an appreciable odour, were found to have a greater absorption of ultra-violet light than distilled water. The absorption of distillates increased by distilling at atmospheric pressure with ice cooling, a spray trap being incorporated in the apparatus. Examples of spectra from filtrates of uni-algal cultures of *Enteromorpha* sp., *Phaeocystis pouchetii* and *Phaeodactylum tricornutum*, bacteria-free *Ectocarpus confervoides* and membrane-filtered sea water are shown in Fig. 1. The overall shape of the absorption curves is somewhat affected by rate of boiling, degree of cooling, alkalinity of sample and freshness of the distillate. This suggests that more than one constituent may be present.

By redistilling distillates under various conditions it is possible to estimate that the recovery of volatile ultra-violet absorbent material is about 50 per cent when a distillate of 250 ml. is collected from a sample of 2.5 l. Measurements with CH_3COOH , $\text{C}_2\text{H}_5\text{COOH}$,