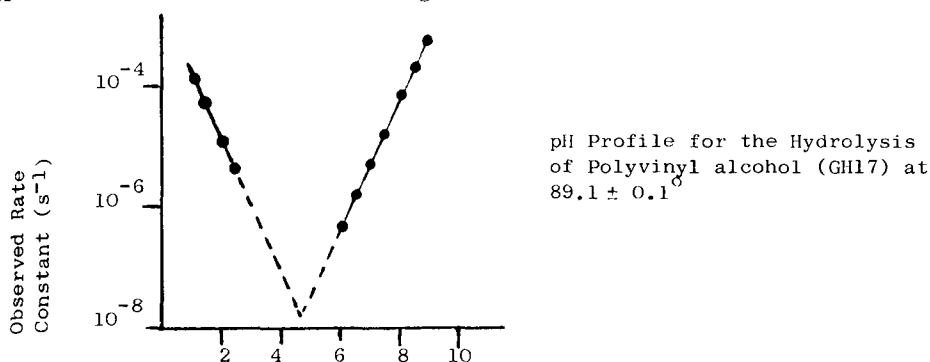


## THE CHEMICAL STABILITY OF POLYVINYL ALCOHOLS

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Polyvinyl alcohols contain residual acetate groups and a preliminary report from our laboratories described the hydrolysis kinetics of a single commercial sample of the material, Gohsenol GH-17, (Nippon Gohsei), (Meakin, 1975). This work has now been extended to include hydrolysis under acidic conditions, and the full pH profile over the range pH 1.1 to 9.0 at 89.1<sup>o</sup> is shown in the figure. Degradation was followed by pH-statting and autotitration and apparent first order kinetics were observed throughout.



The left and right hand limbs of the pH profile had slopes of -1.06 and +1.06 respectively indicating the hydrolysis is subject to specific hydrogen and hydroxyl ion catalysis. Extrapolation suggested the pH of maximum stability is 4.75.

Polyvinyl alcohols which are used in pharmacy as viscolysers, suspending and wetting agents, are available in a variety of grades differing in their molecular weights and degree of hydrolysis and preparations containing these polymers are generally formulated at pH values greater than the predicted minimum. Consequently further studies were carried out in the alkaline region to ascertain whether the hydrolysis varied with the source and grade of material. Activation parameters, which can be used predictively, were therefore determined for a series of polymers at pH 8.5, over the temperature range 50-90<sup>o</sup> and are shown in the table.

PVA Sample	Degree of Hydrolysis (%)	Molecular Weight $M_v$	Activation Energy (KJ mol <sup>-1</sup> )	Frequency Factor (s <sup>-1</sup> x 10 <sup>-10</sup> )
<b>Gohsenol</b>				
GLO5	88.0	48 000	95.2 ± 1.1	1.58
GH17	88.0	175 000	93.6 ± 0.9	1.00
AH22	98.0	144 000	93.3 ± 1.3	1.41
N300	99.0	88 500	95.2 ± 0.6	2.00
NH17	99.5	106 500	92.1 ± 1.2	0.79
<b>Moviol</b>				
8-88	88.0	52 000	99.0 ± 1.0	6.17
18-88	88.0	86 000	97.4 ± 1.7	5.37
26-88	88.0	153 000	99.7 ± 0.9	3.39
<b>Poval</b>				
117	99.0	83 000	93.8 ± 1.6	1.58
124	99.0	133 000	86.4 ± 0.5	0.14
<b>Polyviol</b>				
MO5/140	88.0	40 500	93.1 ± 1.1	0.63

Meakin, B.J., (1975). *J. Pharm. Pharmac.*, 27, 11P.