A NOVEL PENICILLIN ENZYME ELECTRODE

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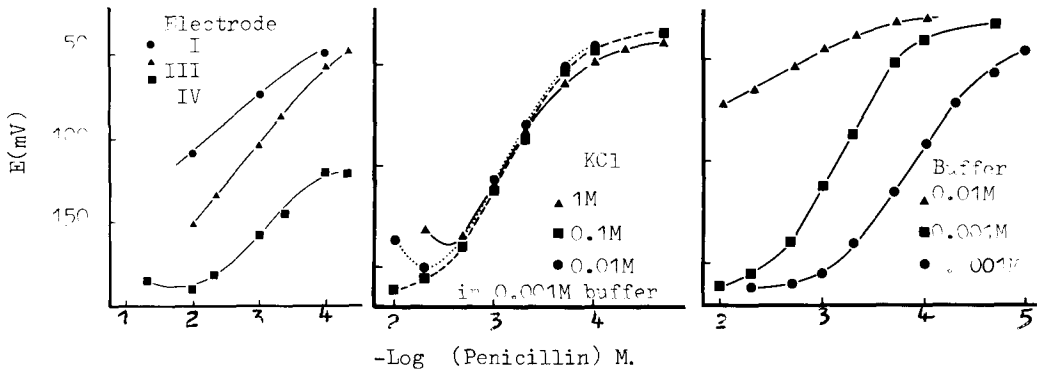
In the literature there are several designs for penicillin enzyme electrodes (Papariello and others, 1973; Nilsson and others, 1973; Cullen and others, 1974; Rusling and others, 1976; Enfors and Molin, 1978). All these have disadvantages with respect to either time for each analysis or sensitivity to cations. The object of the present work was to produce an electrode of fast response time which was insensitive to cations.

After a study of the literature the penicillin electrode was made by covalent linkage of penicillinase to the glass of a pH electrode. The procedure adopted was based on that of Rusling and others (1976). The results given in figure 1 are typical of enzyme electrode behaviour. They were obtained with solutions of potassium benzyl penicillin in 0.001M Sorensen's phosphate buffer at pH 7.1 and are representative of the results obtained with all electrodes prepared. A pH of 7.1 had been shown to give optimum activity for covalently bonded penicillinase to glass. Solutions were not stirred as this caused the potential change to be almost zero for some of the electrodes. The response time varied with the electrode and its age. Four out of the seven prepared electrodes gave response times of less than two minutes.

The response to the cations sodium and potassium was examined by placing the electrodes in a series of solutions containing 10^{-3}M potassium benzyl penicillin and 10^{-4}, 10^{-3} and 10^{-2} M sodium and potassium chloride. The potential change obtained with both salts were of the order 0, 1 and 5 mV respectively. The larger part of these changes can be accounted for by the change in ionic strength. The results for higher concentrations of potassium chloride are shown in figure 2.

The effect of buffer capacity on the linear region of the response of the electrodes with respect to concentration is as would be expected, figure 3.

Figure 1 Figure 2 Figure 3



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