Simple techniques for starch gel electrophoresis

Most published techniques for starch gel electrophoresis involve the use of somewhat complicated apparatus and techniques to provide forms for the gel and to prevent evaporation from and undue temperature changes in the gel during electrophoresis. The techniques described below have the advantage of simplicity while overcoming the difficulties already enumerated.

(1) A plexiglass frame (Fig. 1, C) is made in two identical U-shaped parts (Fig. 1 A and B and Fig. 2) which fit on top of each other. A strip of Whatman No. 1 filter paper is placed over the transverse bar at the base of the U (marked D. 1 in Fig. 1). The frame is slipped into a 250 mm length of 43 mm wide transparent dialysing tubing (Fig. 1, E.3). The dialysing tubing is then clamped transversely just outside the transverse bar of the plastic frame so that the greater part of the strip of filter paper projects from it (Fig. 1, F.1). With the dialysing tubing and plastic held between two glass plates, starch solution (13% solution of Pfanstiehl hydrolysed starch in borate buffer at pH 8.5 or in other suitable buffers) in its sol form is poured in. When the level of the starch sol is close to the top of the frame, a strip of filter paper (similar to that at the lower end of the frame) is placed in position across the upper part of the frame (Fig. 1, D.2) so that a short length of it is covered with starch sol. The open end of the tubing is then clamped so that the greater part of

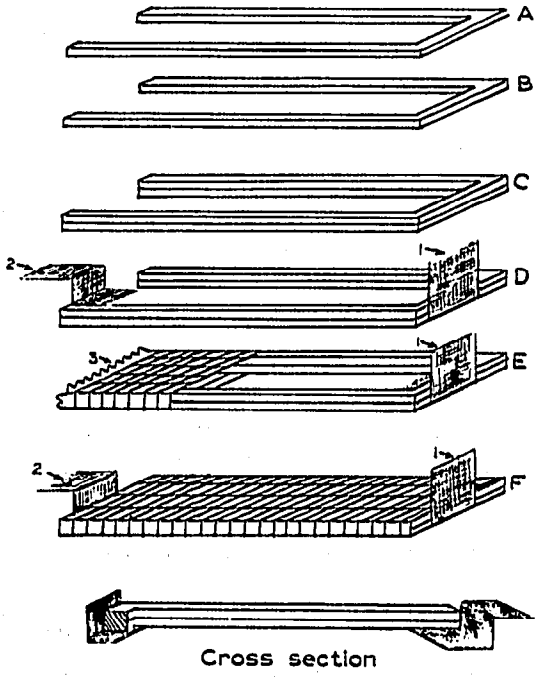

Fig. 1. Diagrammatic representation of the assembly of the apparatus.

this second strip of filter paper projects from it (Fig. 1, F.2). When the starch solution gels, the tube is laid on its side, the upper glass plate removed, a slit made to receive

the sample, the free ends of the filter paper dipped into the electrolyte solution carrying the electrical charge and the electrophoresis carried out in the usual manner.

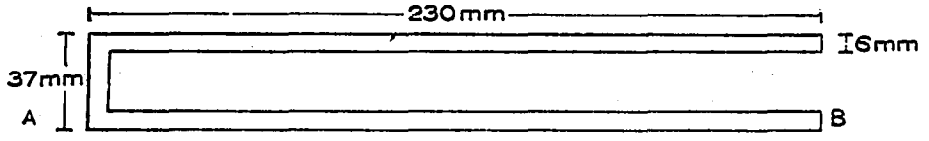

Fig. 2. Detail of the plastic form used in the apparatus.

Once the electrophoresis is complete, the dialysing membrane can be cut and peeled off. If desired, the starch gel can be slit lengthwise into two sections by inserting a razor blade between the two parts of the plastic frame—one part can then be stained to show the distribution of the proteins and the other saved for further investigations.

(2) Chromatographic tubes with ground-glass joints and an internal diameter of 10 mm can be used. The short end with the fritted disc (the inner member) is filled with starch sol and a length of Whatman No. 1 filter strip inserted into its open end. When the starch solution has gelled in this part of the column, it is fitted into the longer piece of the column (the packing column) which is filled with starch sol and a length of Whatman No. 1 filter strip inserted into its open end. After the starch solution has gelled in the longer column, the two pieces of the column are parted and the sample pipetted onto a small disc (7 mm diameter) of filter paper which is laid on the fritted disc so that, when the complete column is reassembled, the sample will lie directly against the starch gel column. The filter paper strips projecting from the ends of the assembled column are allowed to dip into the electrolyte solutions carrying the electrical charge and the electrophoretic operation is begun.

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Contact prints of starch gel electrophoresis patterns

The method of electrophoresis in starch gel first introduced by SMITHIES[1] in 1955 is now used extensively for many purposes. One problem associated with this technique is that of obtaining a satisfactory laboratory record of the separations