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but will rise to the surface of buffer solution 19 and be dissipated in the ambient atmosphere.

The buffer solutions 19 and 20 also serve as heat sinks for the heat generated while the gel electrophoresis apparatus is in use. In the event these heat sinks prove to be inadequate during a particular application, suitable heat exchange means such as cooling coils, the so-called "cold fingers," a heat transfer jacket around cylinder 10, or jar 11, or the like can be utilized.

Also, a cover 25 equipped with a vent hole 26 for the top of cylinder 10 can be provided, if desired.

The present apparatus can be used with a wide variety of electrophoretic gels such as starch gels, silica gels, agar gels, and the like. The gels can be rigid or semi-rigid. Particularly suitable for use with the present apparatus is a semi-rigid, water-insoluble acrylamide polymer gel obtained by copolymerizing acrylamide with methylenebisacrylamide. This gel is practically transparent and can be formed with a minimum of about 2.5 percent of the monomer mixture, the maximum concentration of the polymer in the gel being limited only by the solubility of the acrylamide and methylenebisacrylamide. The crosslinking agent is methylenebisacrylamide and its concentration can be varied from a minimum of about 1 percent of the total monomer content to a maximum of its solubility limit in water. With an increasing polymer concentration, the gel becomes stronger and more rigid. A solid mixture of about 95 percent acrylamide and 5 percent methylenebisacrylamide is commercially available.

The apparatus is readied for use by casting a desired gel, such as the aforementioned acrylamide polymer gel, in the cylinder 10 substantially as shown in FIG. 1. The casting can be conveniently accomplished by first capping the lower end of cylinder 10, filling the cylinder with water to a level sufficiently high to cover the elution plate 13 and the partition 15 when in place, and then placing the latter two elements in their normal positions. Any excess water above the partition 15 is decanted and the desired gel solution poured in place. The air volume above the poured gel solution is swept out by nitrogen and the solution is permitted to set. The time to set can be shortened if the gel solution is deoxygenated.

Once the gel has set, the lower portion of cylinder 10 is uncapped and the water drained therefrom, conduit 14 is connected to elution plate opening 30, and the cylinder 10 suspended in jar 11. Next the buffer solutions 19 and 20 are poured in place, the necessary electrical connections made, and the proteinaceous mixture to be separated is layered on top of the upper surface 27 of gel 16 by means of a pipette or the like. The direct current power source is then turned on and the current passing through the gel is regulated so as to permit the proteinaceous mixture to penetrate gel 16 without undue distortion. When the penetration has been effected, the current flow is increased to the normal operational level and the separation carried out. Sweeping of the collection chamber 29 is commenced just before the first separated component of the mixture passes through partition 15, and is continued until all of the desired components have been recovered.

I claim:

1. Apparatus for electrophoretic separation of proteinaceous materials comprising:

- a column of electrophoretic gel having a top portion and a bottom portion;
- means to establish a substantially uniform unidirectional potential longitudinally across the column;
- a collecting chamber situated below said column and communicating with the bottom portion thereof; and

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recovery means around the periphery of said collecting chamber adapted to sweep a proteinaceous material entering the collection chamber from said column substantially radially toward a centrally situated exit means and downwardly therethrough.

2. Apparatus in accordance with claim 1 wherein the column of electrophoretic gel is supported by a porous, protein-permeable partition.

3. Apparatus in accordance with claim 1 wherein the recovery means comprises an ion-permeable, porous disc juxtaposed below the column of electrophoretic gel and in a spaced relationship therefrom and provided with a central opening communicating with the collection chamber.

4. Apparatus in accordance with claim 1 wherein the means for establishing a uniform unidirectional potential longitudinally across the column comprises a pair of electrodes adapted to be bathed in separate buffer solutions which are in electrical contact with the top and the bottom of said column, respectively, and connected to a source of direct current.

5. Apparatus in accordance with claim 1 wherein the electrophoretic gel is an acrylamide polymer gel.

6. An apparatus for preparative gel electrophoresis which comprises:

- a jar provided with an open end and a bottom, and adapted to contain a buffer solution;
- a cylindrical container, open at both the upper and the lower end thereof, substantially vertically suspended in said jar and adapted to hold therein a column of an electrophoretic gel and a buffer solution thereabove;
- a protein-permeable partition adapted to support the electrophoretic gel, situated near the lower end of said column and extending thereacross in a direction substantially normal to the longitudinal axis thereof;
- an ion-permeable disc juxtaposed below said protein-permeable partition and in a spaced relationship therefrom, therewith defining a collecting chamber, said disc being provided with a central opening which communicates with the collecting chamber and being adapted to regulate the flow of the buffer in the collecting chamber;
- a conduit means communicating with the collecting chamber through the central opening in said disc;
- a first electrode situated within said open-ended jar near the bottom thereof and adapted to be connected to one pole of a direct current power source; and
- a second electrode situated within said cylindrical container near the upper end thereof and adapted to be connected to the other pole of a direct current power source.

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