

[54] **APPARATUS AND METHOD FOR CONTINUOUS COUNTERCURRENT EXTRACTION AND PARTICLE SEPARATION**

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[*] Notice: The portion of the term of this patent subsequent to Apr. 13, 1999 has been disclaimed.

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Related U.S. Application Data

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[58] Field of Search 210/634, 635, 657, 782, 210/198.2, 511, 927; 233/16, 24, 27

[56] **References Cited**

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[57] **ABSTRACT**

A flow-through continuous countercurrent extraction

system consisting of a coiled tube or spiral coplanar channel revolving around a main axis and rotating around its own axis at the same angular velocity and in the same direction. With two solvent phases A and B, there are 5 flow tubes: (1) a feed tube for phase B located at the head end of the column, (2) a return tube for phase A located at the head end, (3) a feed tube for phase A located at the tail end, (4) a return tube for phase B located at the tail end, and (5) a sample feed tube located at the middle portion of the column. The column is mounted on a hollow rotary shaft and the axis of revolution is defined by a stationary hollow central shaft. The 5 flow tubes are led through the hollow rotary shaft, and then through the stationary central shaft. In this way, the flow tubes from the rotary shaft are allowed to rotate freely without interference or twisting. Either a single column may be used, with a counterweight, or there may be two opposite columns operating simultaneously. The ingredients of the sample are separated according to the partition coefficients; when the partition coefficients favor phase A, the solutes are eluted through the head end, and when the partition coefficients favor phase B they may be eluted through the tail end, or they may be retained in the column when the partition coefficient fall between the above values. When the operation is aimed at enrichment and/or stripping of a particular substance or substances, the sample flow tube may not be used, and the sample solution is directly introduced through the head or tail feed tube, while the enriched or stripped solution is continuously collected through either the head or tail outlet tube.

15 Claims, 10 Drawing Figures

