EXPERIMENTAL MODEL TO DEMONSTRATE BREAK-THROUGH CAPACITY

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ABSTRACT

An attempt was taken to develop a simple, rapid and reliable experimental model to demonstrate, break-through capacity which is coming under ion exchange chromatography.

Iron(II) and 1,10-phenanthroline were used as analytes because absorption measurements of these solutions can be made easily. Iron(II)—1,10-phenanthroline complex which is a coloured complex was used as an analyte in order to show break-through point visually.

50 ppm Iron(II) was passed through columns containing different amounts of resin at flow rate of 1 cm^3 /min and eluted fractions of 1.00 cm^3 were treated with 1.00 cm^3 1,10-phenanthroline and pH 4.5 buffer and UV/Visible absorption measurements were made at 470 nm and it is found the time taken to show the break-through point increases with increasing volume of resin.100 ppm 1,10 phenanthroline also used as an influent in the same way.

In order to achieve sensitivity and to compare results Atomic Absorption Spectroscopic measurements also made. It is found that to make AAS measurements analyte concentrations should be at a range of 1-5 ppm and it is not necessary to achieve such a high sensitivity since the objective of this project is a laboratory demonstration method.

In order to show students at a laboratory course instead of treating eluted fractions with reagents, column effluent containing 1,10-phenanthroline directly passed through a spectrophotometer with a flow cell detector and compared with the original1,10-phenanthroline absorption curve. Column effluent containing 1,10-phenanthroline was passed through columns containing different volumes of resin; 0.25 cm^3,0.50 cm^3 by maintaining a constant flow rate at1.00 cm^3/min and the speed of the chart recorder at 1mm/second..

However the easy, quick, low cost way of demonstrating break-through point could be achieved by treating 0.25cm^3 resin under the above conditions.