

## A Comparison of Ion Exchange and Reverse Phase Chromatography for Transition Metal Ion Analysis<sup>1</sup>

*Highlight from the Sixth World Wide Technical Meeting*

The analysis of transition metal ions by LC is a relatively recent development. The two principle methods described in the literature are reverse-phase paired ion chromatography<sup>2,3</sup> and cation-exchange chromatography<sup>4,5</sup>. In this Lab Highlight, the two chromatographic modes of transition metal analysis are compared.

The reverse-phase method for transition metal analysis is carried out on a Waters  $\mu$ Bondapak C<sub>18</sub><sup>TM</sup> Reverse Phase column using a tartrate and octane sulfonate eluent. The metal ions are derivatized post-column with 4-(2-pyridylazo)resorcinol (PAR) and the complexes formed are detected at 520nm. The PAR is added using a Waters<sup>TM</sup> Reagent Delivery Module (RDM). Figure 1 illustrates a separation of eight common transition metals by this method.

Figure 1. Chromatogram of eight transition metals (1ppm each) on  $\mu$ Bondapak C<sub>18</sub>. The eluent contained 2mM sodium octane sulfonate and 50mM tartaric acid adjusted to pH 3.4 with NaOH.

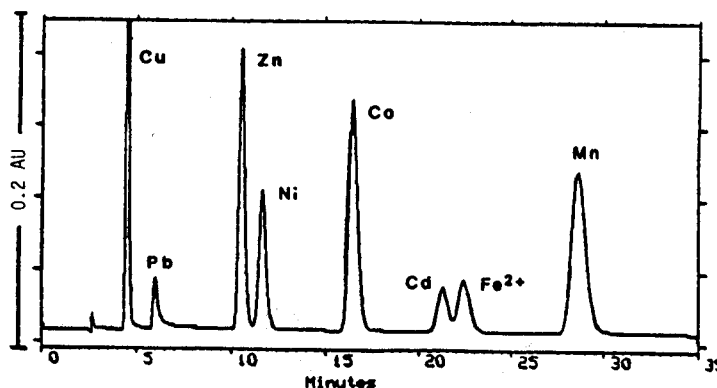
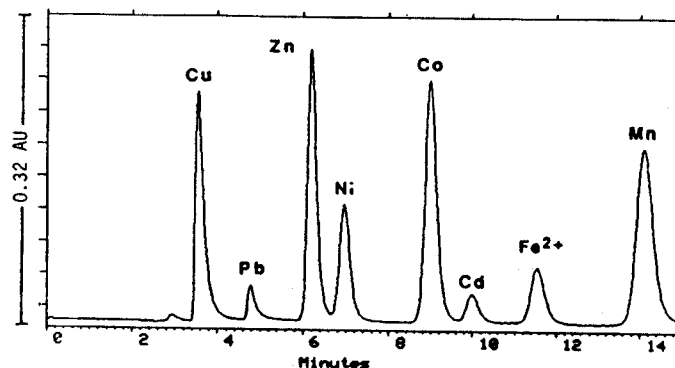


Figure 2. Chromatogram of eight transition metals (1ppm each) on a strong cation exchange column. The eluent contained 90mM tartaric acid adjusted to pH 3.05 with NaOH.



An alternative approach to the separation of transition metal ions is the use of ion exchange. For this comparison we used a Whatman 5 $\mu$  Partisil™ SCX column<sup>6</sup>, a silica-based strong cation exchanger. Octane sulfonate is not required in the eluent when a cation exchange column is used. Figure 2 shows a typical separation of the same eight transition metals using the SCX column, a tartrate eluent and post-column derivatization with PAR. The separation is comparable to that obtained by the reverse-phase/octane sulfonate method, with minor differences in selectivity between the two methods.

Thus cation exchange and reverse-phase/paired ion chromatography are alternative methods for the separation of transition metal ions. The appropriate choice of method will be dependent on the particular application.

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#### References:

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2. J. Krol, *Waters Ion Chromatography Notes*, 2, 3 (1988).
3. R. M. Cassidy and S. Elchuk, *Anal. Chem.*, 54, 1558 (1982).
4. D. Yan and G. Schwedt, *Fresenius Z. Anal. Chem.*, 327, 503 (1987).
5. Atlas of Chromatograms, LC75, *J. Chromatographic Sci.*, 26, 484 (1988).
6. Partisil-5 SCX is available from Whatman, Cat. No. 4671-0507.

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