

Separation of Organic Acids and Bases, Using a SUPELCOGEL TPR-100 HPLC Column

The analysis of organic acids and bases is necessary in the pharmaceutical, and food and beverage industries. SUPELCOGEL TPR-100 columns are successful in separating organic acids and bases under isocratic conditions. The absence of any silanol group in the templated resin phase of this column makes it versatile and durable under harsh separation conditions.

Key Words:

silanol group • templated resin • organic acids
organic bases • SUPELCOGEL TPR-100 column

Organic acids are used in medicines, as food preservatives, and as components in foods or beverages. A large quantity of the organic base aniline is used in the United States each year during the manufacture of pharmaceuticals and agricultural chemicals. The majority of pharmaceutical compounds are basic in nature, although intermediates, or impurities, of these compounds frequently are acidic. Pharmaceutical and food industries often require analyses of samples to separate organic acids or bases.

Separation of basic compounds sometimes is very difficult with silica-based columns. Residual silanol groups interact with the basic compounds, resulting in peak tailing and unsatisfactory recovery of compounds. Some applications may require very high or very low pH mobile phases. However, when a silica-based C18 column is used with a very low pH mobile phase, the retention time drifts and there is poor column-to-column reproducibility. In contrast, a resin-based SUPELCOGEL™ TPR-100 column eliminates such problems because it has no residual silanol groups. The templated resin is versatile and durable under harsh separation conditions. This column is successful in separating both organic bases and acids, using isocratic conditions.

A sample containing seven acids with different characteristics and functionality is separated on a SUPELCOGEL TPR-100 column (Figure A). The baseline separation of these acids using the SUPELCOGEL TPR-100 column, under isocratic conditions, is very impressive.

A separation of organic bases is shown in Figure B. Separation of organic amines with silica-based columns usually requires special experimental conditions. Using the SUPELCOGEL TPR-100 column, we can separate all components in less than 10 minutes, under isocratic conditions. The SUPELCOGEL TPR-100 column would be the best choice for this type of analysis. Primary and tertiary amines separated on the SUPELCOGEL TPR-100 column also produced chromatograms with little or no tailing (analysis not shown).

Many chromatographic systems show linear relationships in van't Hoff plots, indicating a single retention mechanism. Sharp discontinuities in the slopes indicate a mixed mechanism — a change in solute conformation that influences binding, or the existence of more than one form of the solute that have different retention characteristics. Effect of temperature on the separation of anilines is shown in Figure C. A plot of k' versus the inverse of temperature (K) is shown. The linearity in the plots indicate that a single retention mechanism is operative.

The reversed phase properties of SUPELCOGEL TPR-100 also was characterized for the alkylbenzoic acids and the alkyanilines. Figure D shows the plot of $\log(k')$ versus the number of methylene groups for the alkylbenzoic acids and the alkyanilines. Please note that for the compounds investigated, there is a linear relationship between the logarithm of the capacity factor and the number of methylene groups in the alkyl chain.

Figure A. Organic Acids on a SUPELCOGEL TPR-100 Column

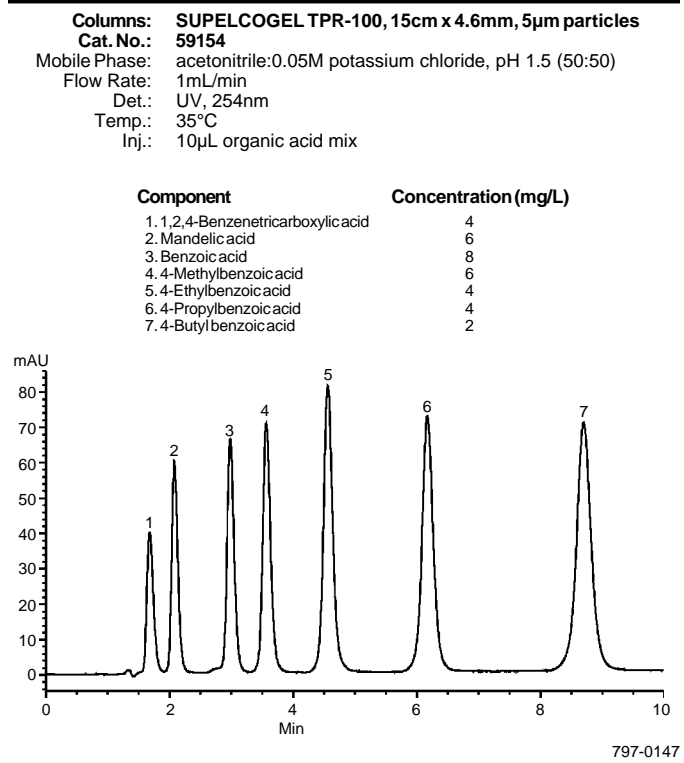


Figure B. Organic Bases on a SUPELCOGEL TPR-100 Column

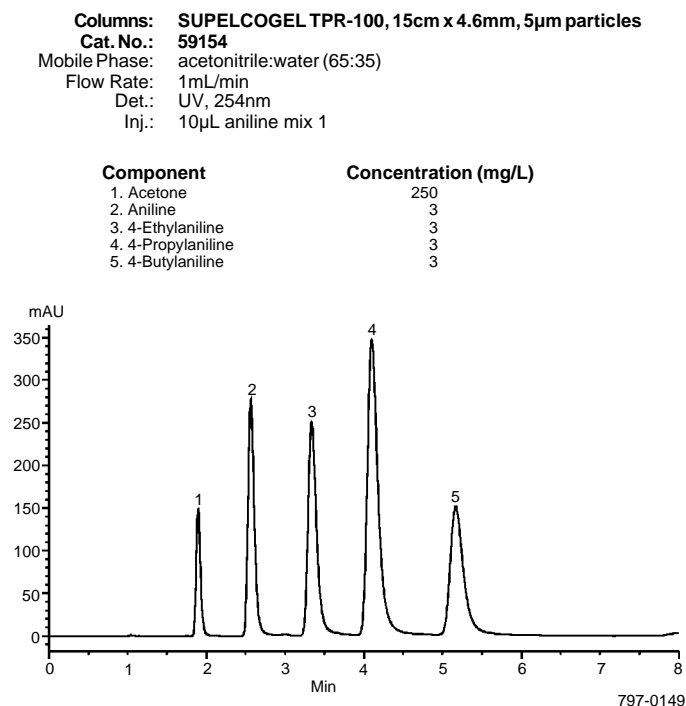


Figure C. van't Hoff Plot on the Separation of Anilines

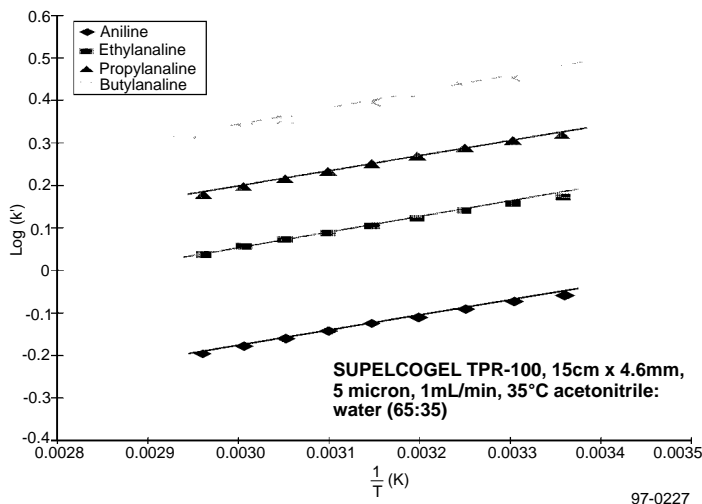
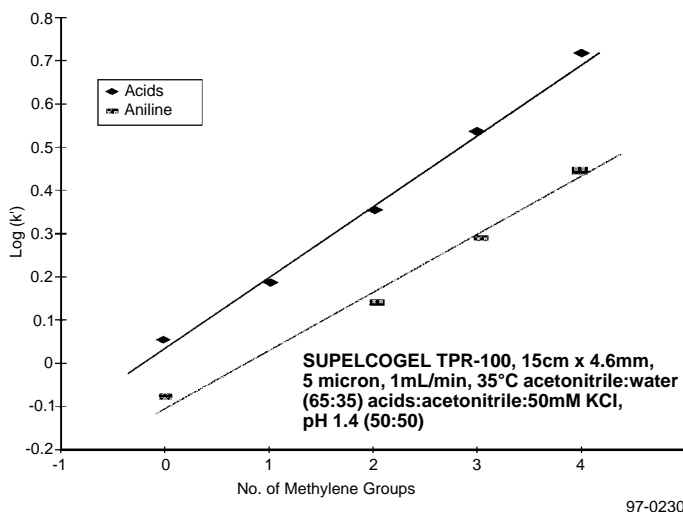


Figure D. Homologous Series on TPR-100: Organic Acids and Anilines



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Ordering Information:

Description	Cat. No.
SUPELCOGEL TPR-100 Column 15cm x 4.6mm, 5µm particles	59154

Refer to the Supelco catalog for aniline and other chemical standards.

Contact our Technical Service Department (phone 800-359-3041 or 814-359-3041, FAX 800-359-3044 or 814-359-5468) for expert answers to your questions.

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