

Waters

Lab Highlights

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A Comparison of Waters™ Reverse-Phase Columns

How do Waters bonded silicas compare in terms of hydrophobicity? The answer to this question depends on the samples and eluents chosen.

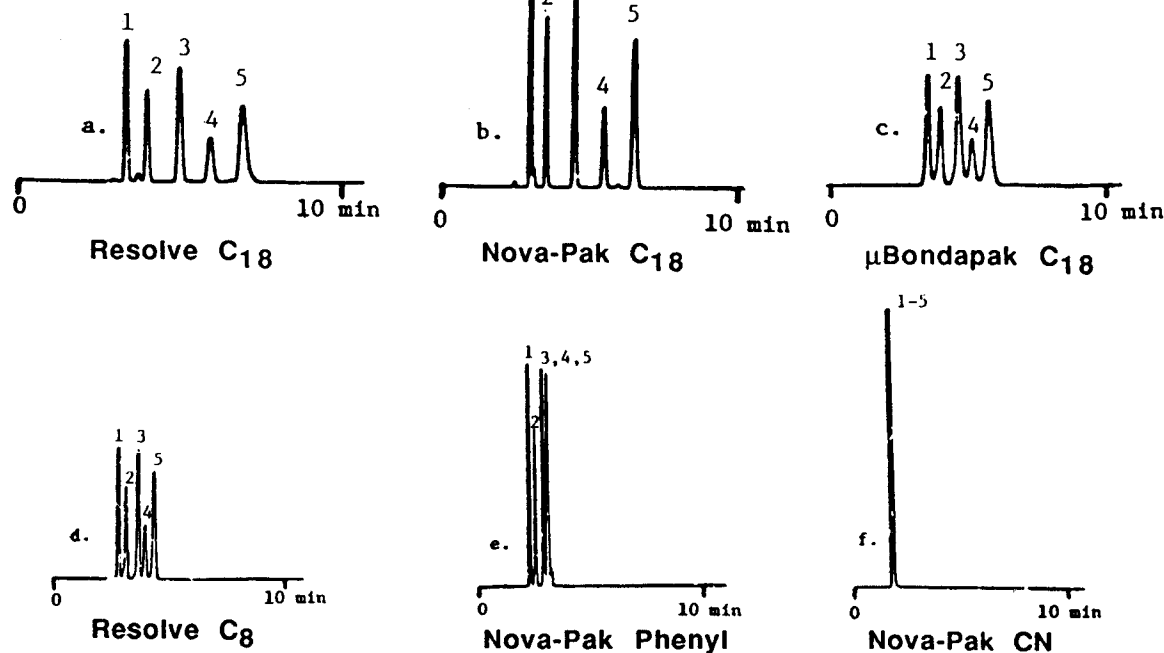
The following chromatograms illustrate two different sets of samples and eluents run on Radial-Pak™ cartridges (8 mm), packed with Nova-Pak® C₁₈, Nova-Pak Phenyl, Nova-Pak CN, μBondapak™ C₁₈, Resolve™ C₁₈, and Resolve C₈. Each column was run in the RCM 8 x 10 holder with both anti-convulsant drugs and aromatic hydrocarbon samples.

According to theory, retention should be proportional to carbon content of the stationary phase, or more precisely, retention is proportional to weight of carbon per cc column volume. When the different base silica pore volumes and carbon loads are taken into consideration, the packings can then be ranked in order of decreasing hydrophobicity: Resolve C₁₈, Nova-Pak C₁₈, μBondapak C₁₈, Resolve C₈, Nova-Pak Phenyl, and Nova-Pak CN. Retention of the five aromatic hydrocarbons (Figure 1) correlated well with this prediction, in a 70% CH₃CN/30% H₂O mobile phase.

Figure 1: Aromatic Hydrocarbons

Peak Identification

1. toluene
2. naphthalene
3. biphenyl
4. acenaphthene
5. 2,3 dimethylnaphthalene



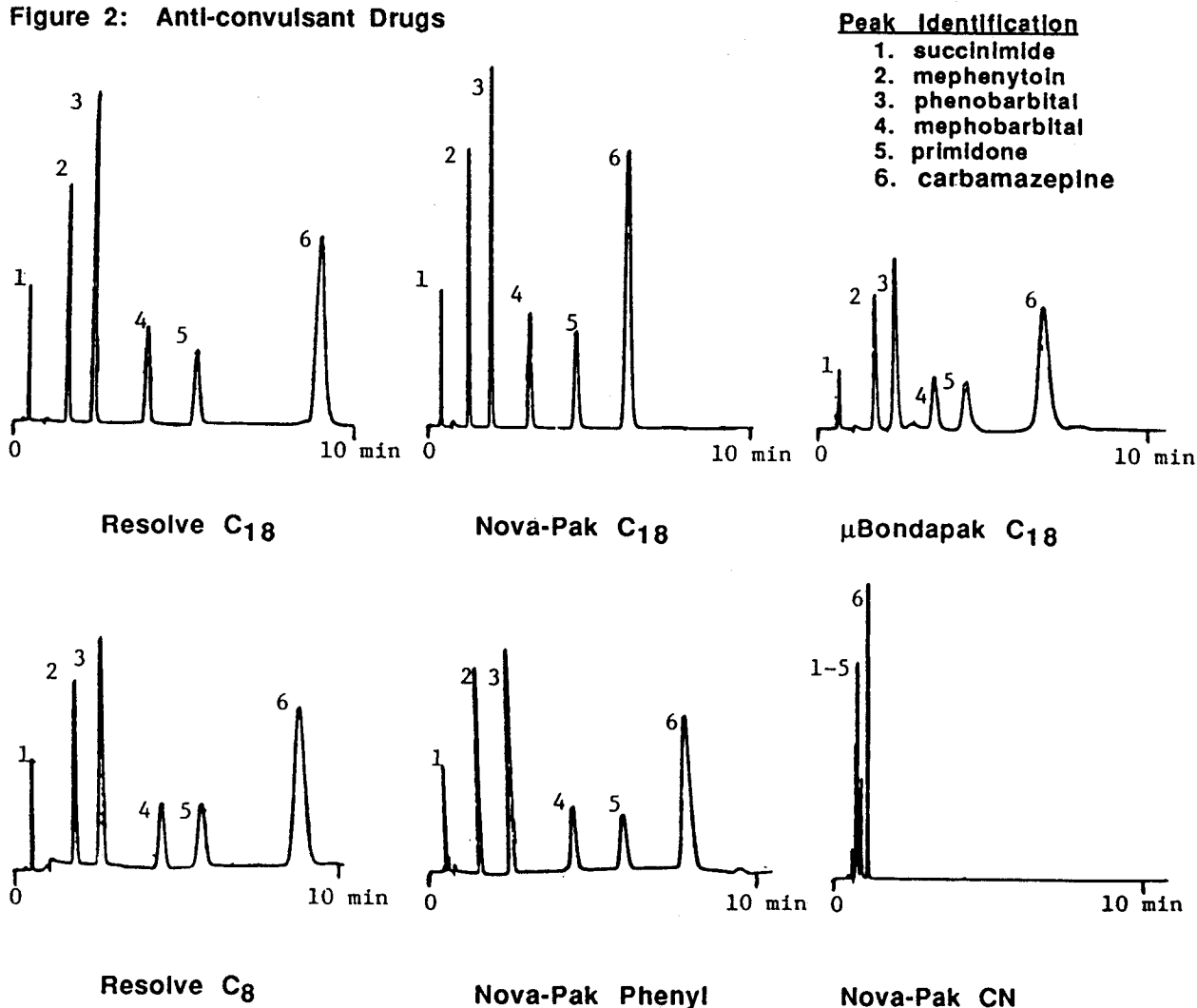
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In contrast, the drug samples did not yield the same retention rank (Figure 2). In this case the eluent was 60% 5 mM KH_2PO_4 , pH 4.4/40% CH_3OH . The acidic pH is required to suppress ionization of the barbituric acid derivative drugs. The relatively high water content of the eluent as well as the polarity of the drugs, result in non-ideal behavior in comparison with that obtained with the first set of samples. In this case the retention order obtained was Resolve C_{18} , Resolve C_8 , Nova-Pak Phenyl, $\mu\text{Bondapak C}_{18}$, Nova-Pak C_{18} , and Nova-Pak CN. The increased retention of Resolve C_8 may be due to a contribution from silanol interactions on the un-encapped surface. In the case of Nova-Pak Phenyl, some π - π electron interactions may be present arising from phenyl groups of packing and sample.

Figure 2: Anti-convulsant Drugs



In comparing Figures 1 and 2, note that there are only subtle differences in the relative retention of the drugs on the different columns. This effect may be due to some folding of the longer C_{18} chain onto itself in the 60% aqueous mobile phase.

The data shows that for neutral solutes with mobile phases of high organic content, retention is proportional to percent carbon. In eluents with high water content and polar solutes, however, differences between stationary phases become less significant.

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