Additives in Soft Drinks

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Foods and beverages provide challenges for analysis because of the complexity of the sample matrices; however, high performance liquid chromatography (HPLC) is well suited to the analysis of its individual components found in such samples because of its ability to separate and quantify the individual components. The challenge for HPLC is to obtain retention of the hydrophilic components that can be found in such samples. The more commonly used C8 or C18 columns do not always provide the selectivity necessary to retain and separate such hydrophilic compounds. The introduction of HPLC columns containing polar endcapping and/or polar embedded groups allows for the retention of these hydrophilic compounds. Ideally, these separations would be performed in a single isocratic run, while keeping retention times to a minimum and maintaining adequate resolution for accurate quantification. The conditions described in this application offer a solution to these requirements for additives commonly found in soft drinks that cannot be separated on conventional alkyl-bonded phases.

Introduction

The major problem in analysing soft-drink additives is retaining the highly polar components while keeping the retention times of the hydrophobic analytes down to an acceptable *k'* range. Because of its high polarity, ascorbic acid is virtually unretained using conventional alkyl-bonded phases when using conditions that elute the more hydrophobic components within a working *k'* range. Our goal was to increase retention of ascorbic acid beyond the void while keeping the latest eluting peak within a *k'* value of 5.

Instrumentation/Equipment

An HP1090 HPLC equipped with a binary reciprocating piston pump, manual injector and diode array detector was used with a Phenomenex Synergi® 4 µm Polar-RP 150 × 4.6 mm for analysis.

Experimental Conditions

The mobile phase consisted of 0.1% phosphoric acid:methanol (50:50); a flow-rate of 1.0 mL/min; UV detection at 220 nm and a column temperature of 25 °C.

Results

The eight standard soft-drink additives were separated with baseline resolution while keeping all *k'* values in a range of 0.3 to 4 using isocratic running conditions. The *k'* values were 0.3 for ascorbic acid and 3.8 for the last eluting peak, caffeine. Retention of the highly polar ascorbic acid, was sufficient when using the Synergi® Polar-RP because of the increased retention of highly polar analytes on this unique polar-embedded and polar-endcapped column.

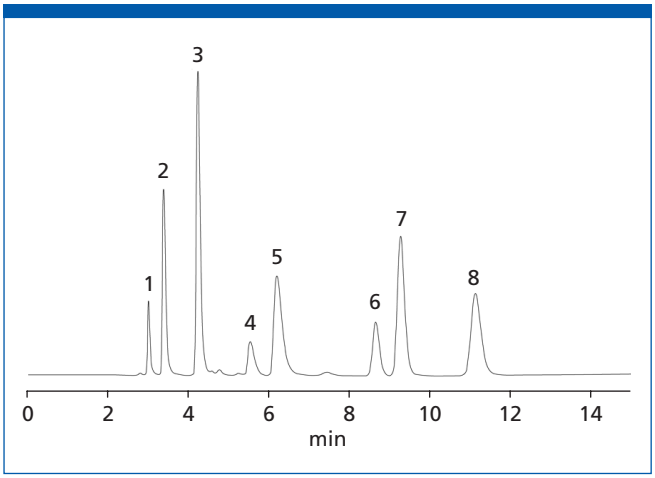

Figure 1: *A standard mixture of soft drink additives was chromatographed with a Phenomenex Synergi 4 µm Polar RP column. Peaks: 1 = ascorbic acid, 2 = acesulfame K, 3 = saccharin, 4 = aspartame, 5 = quinine, 6 = sorbate, 7 = benzoate, 8 = caffeine.*

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