XLC APPLICATION NOTE 03-09

Ultra-High Speed Separation of Food Additives in a Soft Drink Using Extreme High Pressure Liquid Chromatography (X-LC®) with a 4λ-UV Detector

Introduction

Food additives are substances added to food as preservatives, antioxidants, emulsifiers, etc. Recent increase in consumption of processed foods has introduced more additives. Securing food safety demands determination of these additives. High performance liquid chromatography (HPLC) has been used for the measurement of these food additives.

We examined the usefulness of an X-PressPak V-C (2.0 mm I.D. x 50 mm L.) packed with 2 µm diameter packing material for the ultra-high speed separation of food additives. We used a 4λ–UV detector for the simultaneous monitoring of these additives at four different wavelengths. The results were examined to determine whether the performance of the column and chromatography system exceeds those of conventional HPLC.

Experimental

The system utilized in this experiment was a JASCO X-LC system consisting of two 3085-PU pumps, 3080-DG mobile phase degasser, 3080-MX mixing unit, 3067-CO column oven, 3177-UV 4λ-UV detector, 3059-AS autosampler, and ChromNAV chromatography data system.

The method was applied to the analysis of soft drinks. The soft drink was purchased at a grocery store, diluted 5 times with a mixture of 0.3% phosphoric acid / acetonitrile (95/5), and then filtered with 0.2 µm membrane filter.

Results and Discussion

Figure 1 shows an X-LC chromatogram of a standard mixture of 11 food additives. The X-LC system provides 5 times shorter analysis time than conventional HPLC without sacrificing the resolution.

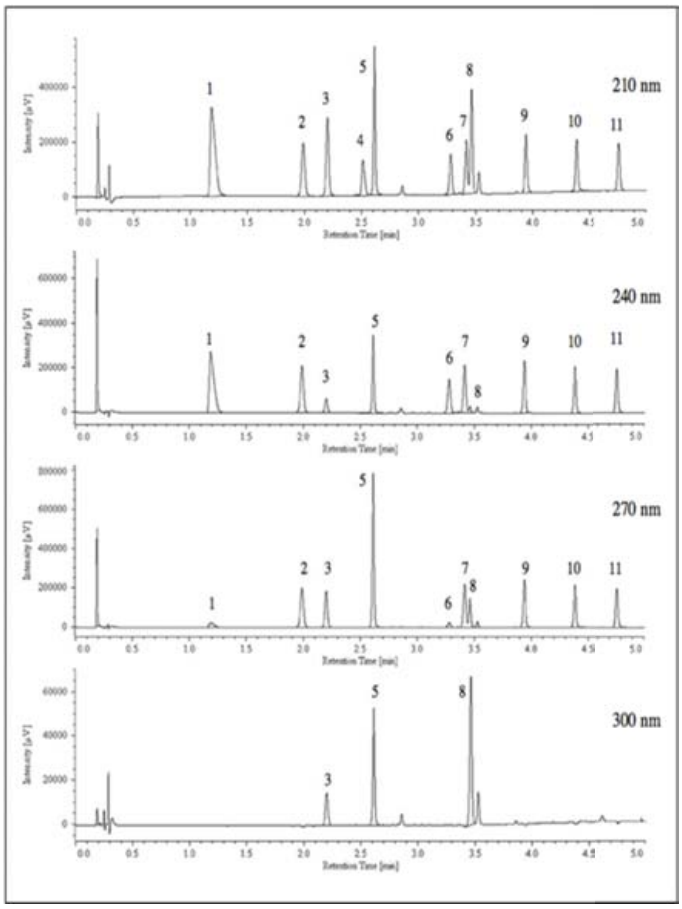

Figure 1. X-LC chromatogram of a standard mixture of food additives.
Peaks: 1=acesulfame K (0.2 mg/mL), 2=p-hydroxybenzoic acid (0.05 mg/mL), 3=caffeine (0.05 mg/mL), 4=aspartame (0.1 mg/mL), 5=vitamin B2 (0.1 mg/mL), 6=benzoic acid (0.05 mg/mL), 7=methylparaben (0.05 mg/mL), 8=propyl gallate (0.05 mg/mL), 9=ethylparaben (0.05 mg/mL), 10=propylparaben (0.05 mg/mL), 11=butylparaben (0.05 mg)
Chromatographic conditions: column=X-PressPak V-C18 (2.0 mmID x 50 mmL, 2 µm); column temperature=40°C; mobile phase: A=0.3% phosphoric acid, B=acetonitrile, 0min=A/B(95/5), 1.3min=A/B(85/15), 1.7min=A/B(85/15), 5min=A/B(30/70), 5.1 min=(10/90), 6 min=(10/90), 6.1 min=(95/5), injection interval=8 min; flow rate=0.5 mL/min; detection wavelengths=210 nm, 240 nm, 270 nm, 300 nm, injection volume=1 µL.

Figure 2 shows an X-LC chromatogram of the soft drink sample. The six food additives present were clearly separated from unidentified peaks.

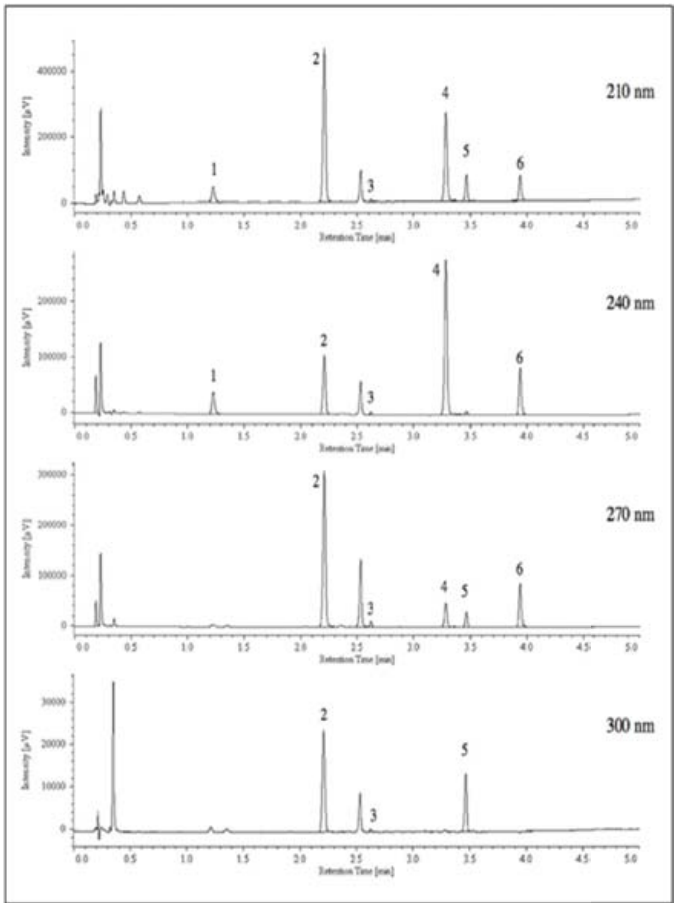

Figure 2. X-LC chromatogram of the soft drink.
The sample is diluted 5 times with 0.3% phosphoric acid/acetonitrile(95/5), and filtered with 0.2 µm membrane filter. The other conditions are the same as in the Figure 1 caption.

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