Analysis of Caffeine by Micellar Electrokinetic Capillary Chromatography

Micellar electrokinetic capillary chromatography (MEKC) is a chromatographic technique performed using capillary electrophoresis instrumentation. Analytes are separated by partitioning between an aqueous electrolyte and a pseudophase of surfactant molecules organized in micelles. Analytes, micelles, and the bulk electrolyte are transported toward the detector by electroendosmosis (EOF). The method described here employs uncoated capillaries which, when used with an alkaline electrolyte, exhibit a high EOF toward the cathode. Sodium dodecyl sulfate is used at a concentration well above the critical micelle concentration to form the pseudophase. The surfactant monomers and micelles are anionic, so have an electrophoretic mobility counter to the direction of EOF. Therefore, the movement of neutral hydrophobic analytes will be retarded by partitioning into the micellar pseudophase.

In this note, MEKC was used to analyze caffeine in samples of coffee, tea, and a diet cola soda. Samples were analyzed directly with no sample preparation. Prior to use, the capillary was conditioned by washing at 100 psi second for 15 minutes with 0.1 N HCl, 5 minutes with deionized water, 15 minutes with 0.1 N NaOH, 5 minutes with deionized water, and 15 minutes with run buffer.

Results

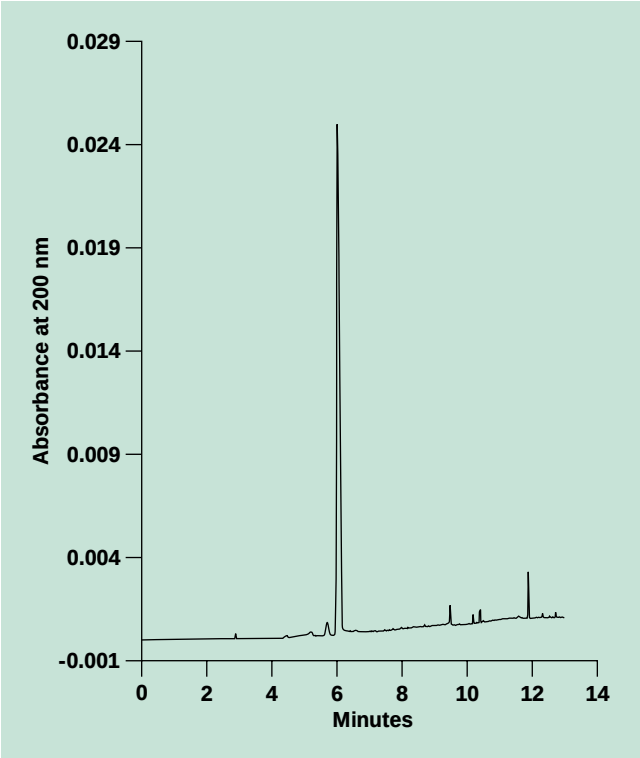

Fig. 1. Analysis of a standard solution of caffeine (1 mg/ml in water) by MEKC.

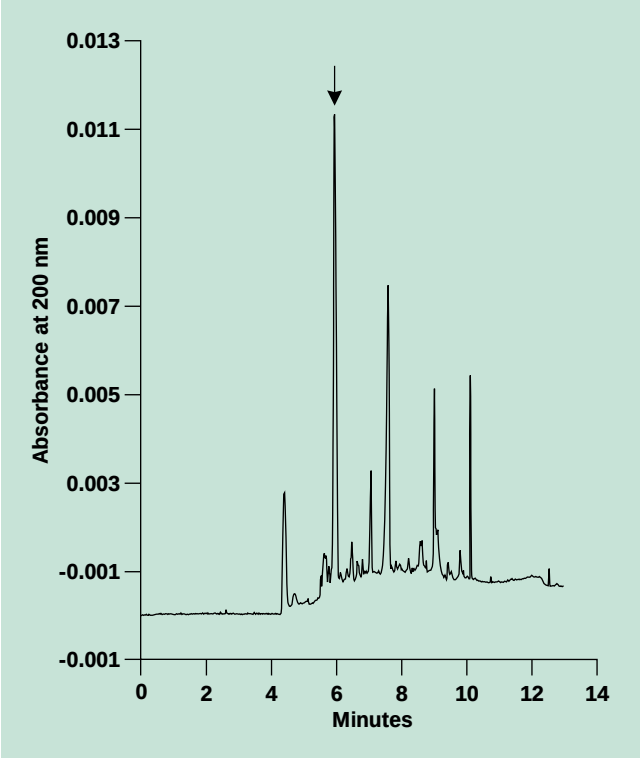

Fig. 2. Analysis of caffeine (indicated by arrow) in coffee by MEKC.

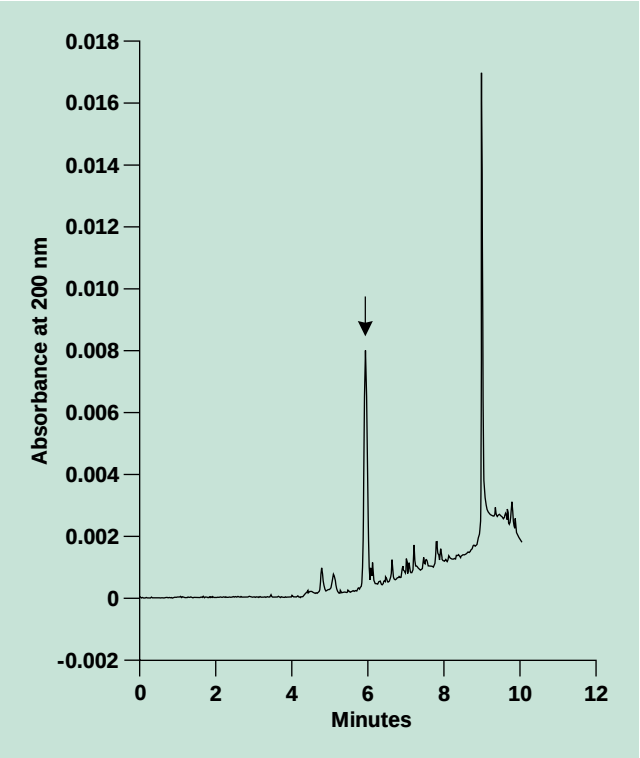

Fig. 3. Analysis of caffeine (indicated by arrow) in tea by MEKC.

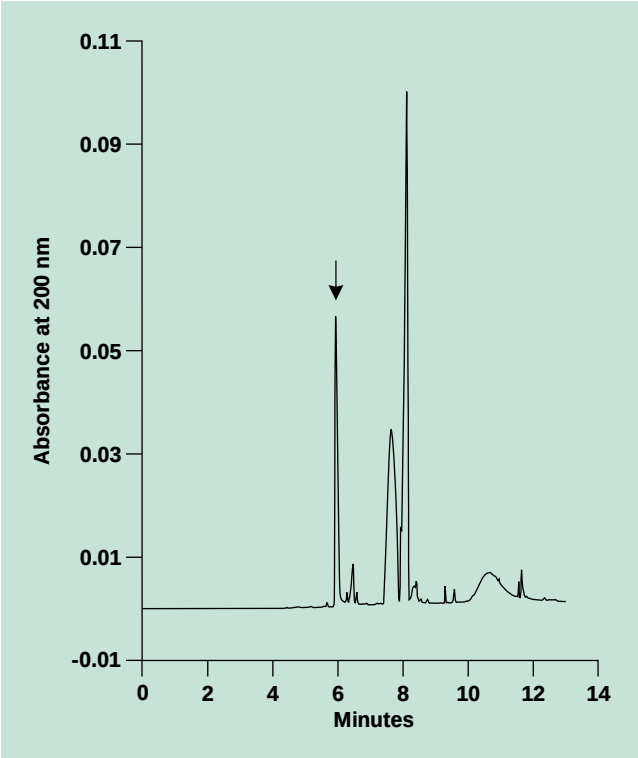

Fig. 4. Analysis of caffeine (indicated by arrow) in diet cola soda by MEKC.

Analysis Conditions

Instrument	BioFocus® 3000 system
Polarity	positive to negative
Capillary	50 cm x 50 µm, uncoated
Run buffer	0.05 M borate, pH 9.0
	0.05 M SDS
Capillary purge	60 sec with run buffer
Injection	pressure at 10 psi*second
Run voltage	15 kV
Detection	200 nm
Cartridge temperature	20 °C
Autosampler temperature	20 °C

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