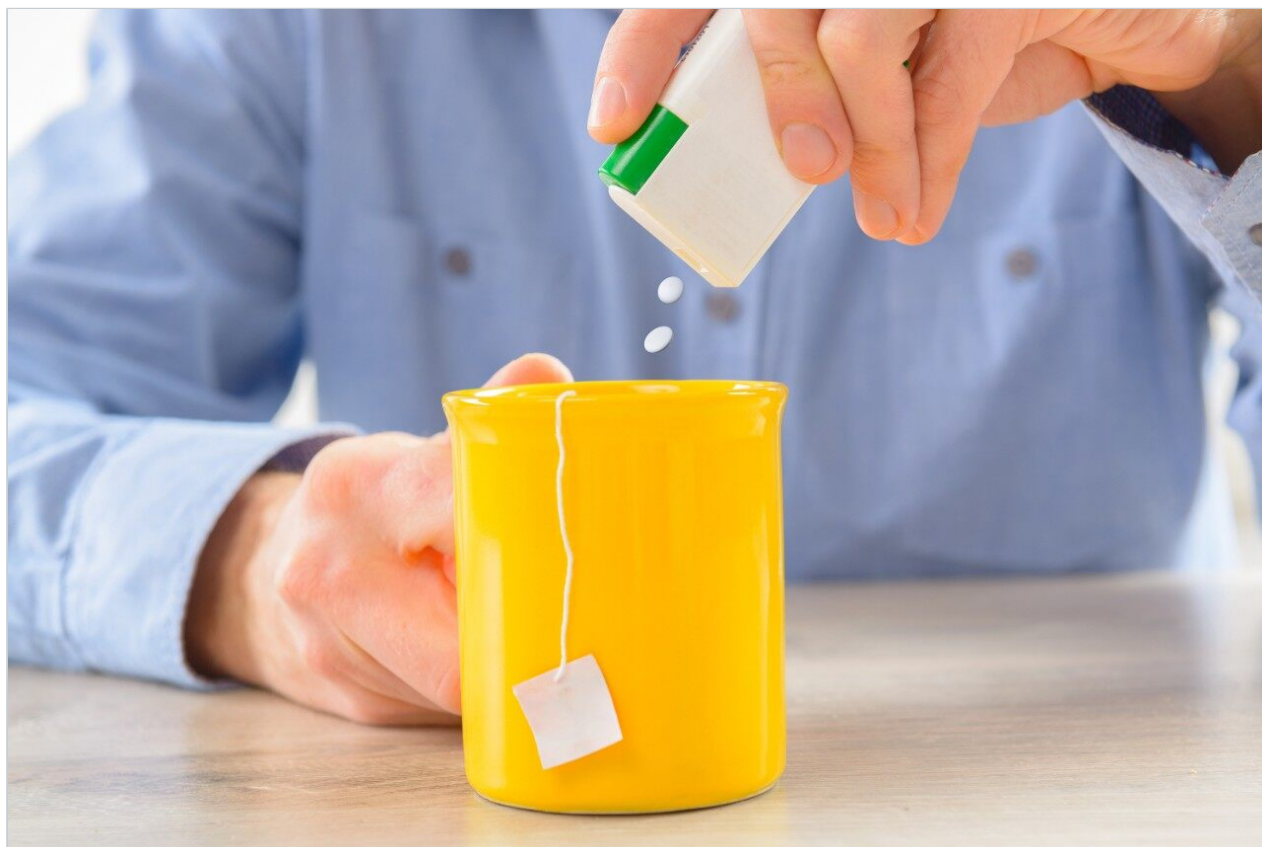




Fast Screening for Non-Nutritive Sweeteners using the ACQUITY UPLC H-Class System with ELSD

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Abstract

This application brief rapidly analyze artificial sweeteners in beverages and canned fruits using SPE followed by the ACQUITY UPLC H-Class System with ELSDs.

Benefits

Run multiple samples in under five minutes using the ACQUITY UPLC H-Class System coupled with an ELSD.

Introduction

The increase in obesity due to the consumption of sugary foods has reached epidemic levels, especially in the developed world. Food manufacturers are therefore resorting to noncaloric sweeteners to reverse this trend. Ideally, a blend of sweeteners will mimic the taste and sensation of sugar as closely as possible.

Common sweeteners used today are aspartame, saccharin, acesulfame K, and sucralose. Less common substances include sodium cyclamate, NHDC (neohesperidin dihydrochalcone), and neotame. Regulations vary as to the legality of certain sweeteners in various parts of the world.

Because of the different regulations, it is desirable to have a rapid method that can be used to look for the presence of these sweeteners. Acesulfame K, saccharin, and aspartame, along with caffeine and certain preservatives, are routinely analyzed in soft drinks using UV detection. However, cyclamate and sucralose are UV transparent rendering UV detection unfeasible.

Results and Discussion

Using a Waters ACQUITY UPLC H-Class System equipped with an Evaporative Light Scattering Detector (ELSD), separation of the seven listed analytes can be achieved in less than five minutes, as shown in Figure 1. This method uses UPLC HSS T3 Column chemistry and a ternary gradient. A calibration curve using a log linear fit is employed for quantification. This procedure can also be used for qualitative screening.



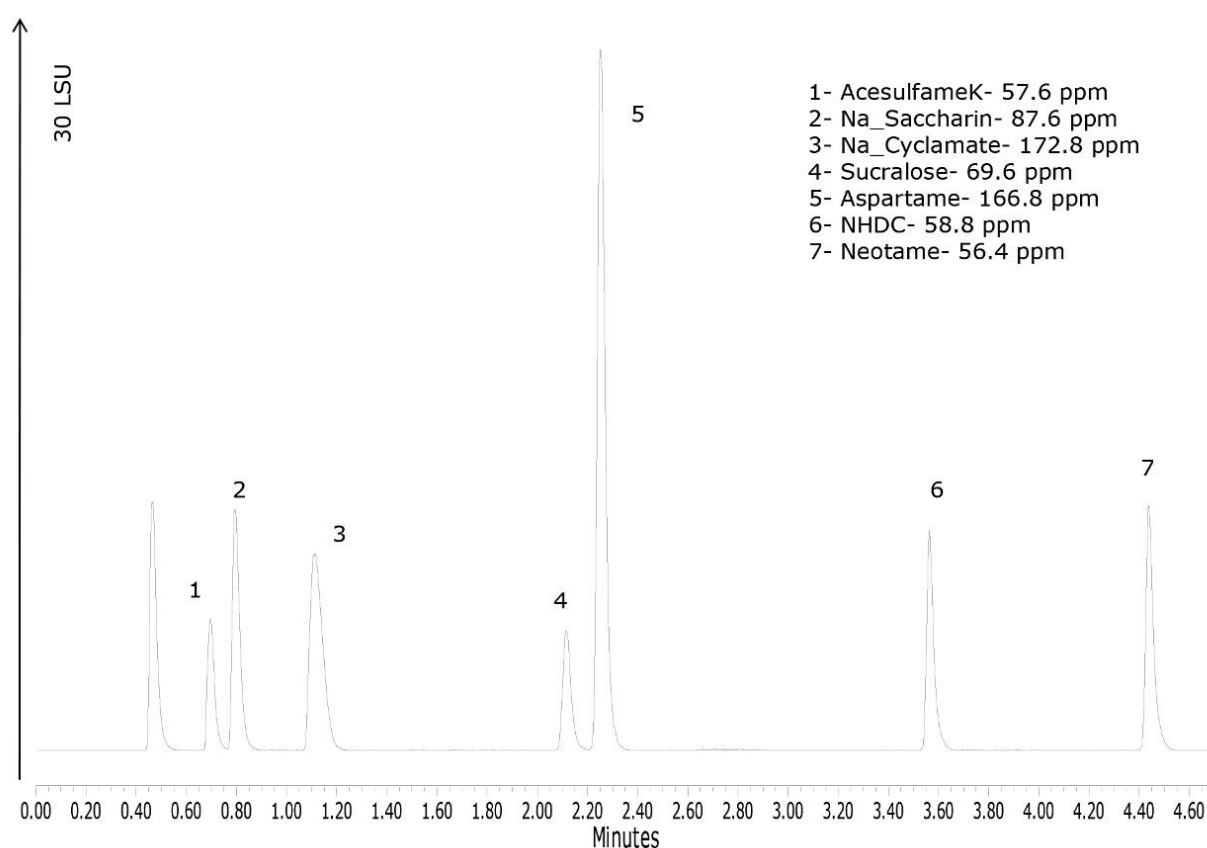


Figure 1. ELSD Chromatogram of the UPLC separation of seven sweeteners.

For simple beverage samples, filtration and, if necessary, degassing to remove carbonation can be employed prior to direct injection of the samples. For more complicated matrices, a simple cleanup using Sep-Pak C₁₈ Cartridge can be used for sample preparation. This procedure is described in the European Commission's validated method for the analysis of nine sweeteners (EUR 22727 EN, A. Wasik and M. Buchgraber, 2007). The sample, canned fruit in this example, was homogenized and thoroughly mixed with a buffer solution, then centrifuged. The supernatant was loaded onto a Sep-Pak C₁₈ Cartridge, washed, and the analytes eluted with methanol. Chromatograms from a diet soft drink and canned diet pears carried through this procedure is shown in Figure 3. Three of the sweeteners were identified and quantified in the soft drink and two were identified and quantified in the canned pear sample.

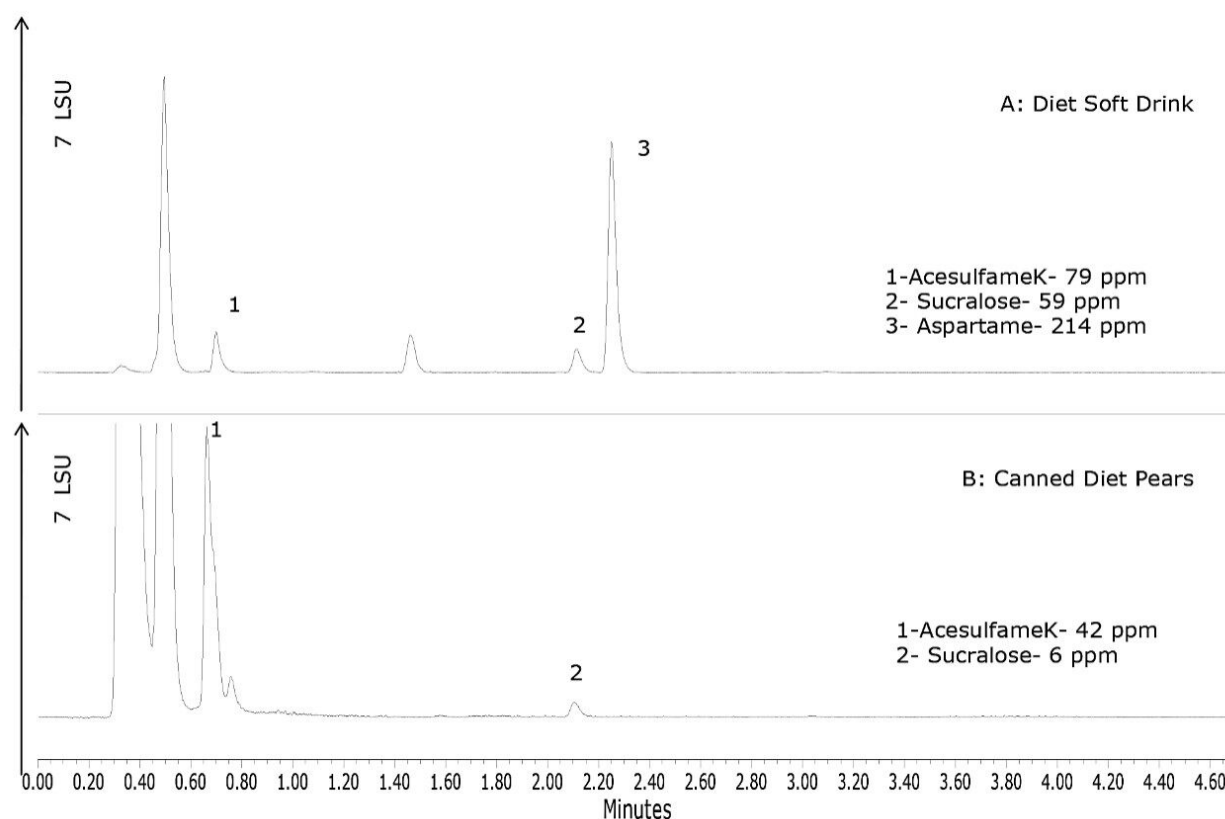


Figure 3. ELSD chromatograms of two samples following SPE cleanup. A: diet soft drink; B: canned diet pears. The calculated concentrations of each of the detected sweeteners is shown (with sample preparation adjustments accounted for in the final value).

Conclusion

Using the ACQUITY UPLC H-Class System with ELSD detection, baseline separation of seven sweeteners can be achieved in less than five minutes. The short run time allows many samples to be run either for screening purposes, or as a quantitative QC check.

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ACQUITY UPLC H-Class PLUS System <<https://www.waters.com/10138533>>

ACQUITY UPLC ELS Detector <<https://www.waters.com/514219>>

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