

Soft Drink Analysis Using the ACQUITY UPLC H-Class PLUS System

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This is an Application Brief and does not contain a detailed Experimental section.

Abstract

This application brief demonstrates the successful analysis of additives found in soft drink beverages using an ACQUITY UPLC H-Class PLUS System with UV detection and a Waters' Beverage Analysis Kit.

Benefits

The ACQUITY UPLC H-Class PLUS System with UV detection is a high-performance and reliable analytical system for quick and accurate analysis of soft drink additives.

Introduction

Many of the soft drinks available on the market, especially diet formulations, can contain non-nutritive sweeteners such as acesulfame potassium (ASK), sodium saccharin, and aspartame; as well as preservatives, such as sodium benzoate and potassium sorbate. In case of energy formulations, caffeine may also be present. As a particular beverage can contain all or some of these six ingredients at varying concentrations, reliable and simple analytical techniques are required to accurately measure them during production and final packaging. These frequent measurements enable the quality control laboratories of the production facility to confirm that the six additives are present within the specified concentrations, which is essential for consistent product quality and taste.

In this technology brief, we demonstrate that the ACQUITY UPLC H-Class PLUS System, coupled with UV detection and The ACQUITY UPLC H-Class PLUS System with UV detection is a high-performance and reliable analytical system for quick and accurate analysis of soft drink additives. integrated with the Waters Beverage Analysis Kit,¹ is a highly robust, reliable performance analytical technique for the accurate analysis of additives in soft drink beverages.

Results and Discussion

The ACQUITY UPLC H-Class PLUS System with UV detection and the Beverage Analysis Kit provides a quick and reliable analytical approach for accurate detection of sweeteners, preservatives, and caffeine in

soft drinks. The Beverage Analysis Kit¹ minimizes the need for sample preparation by providing a pre-formulated mobile phase, wash reagent, standards, as well as detailed methodology.

The Beverage Analysis Standard with the six analytes (acesulfame potassium, sodium saccharin, sodium benzoate, potassium sorbate, caffeine, and aspartame) was analyzed on both the ACQUITY UPLC H-Class and the ACQUITY UPLC H-Class PLUS Systems. As displayed in Figure 1, the chromatographic separation acquired on both systems was comparable. The chromatographic resolution between all six analytes was excellent.

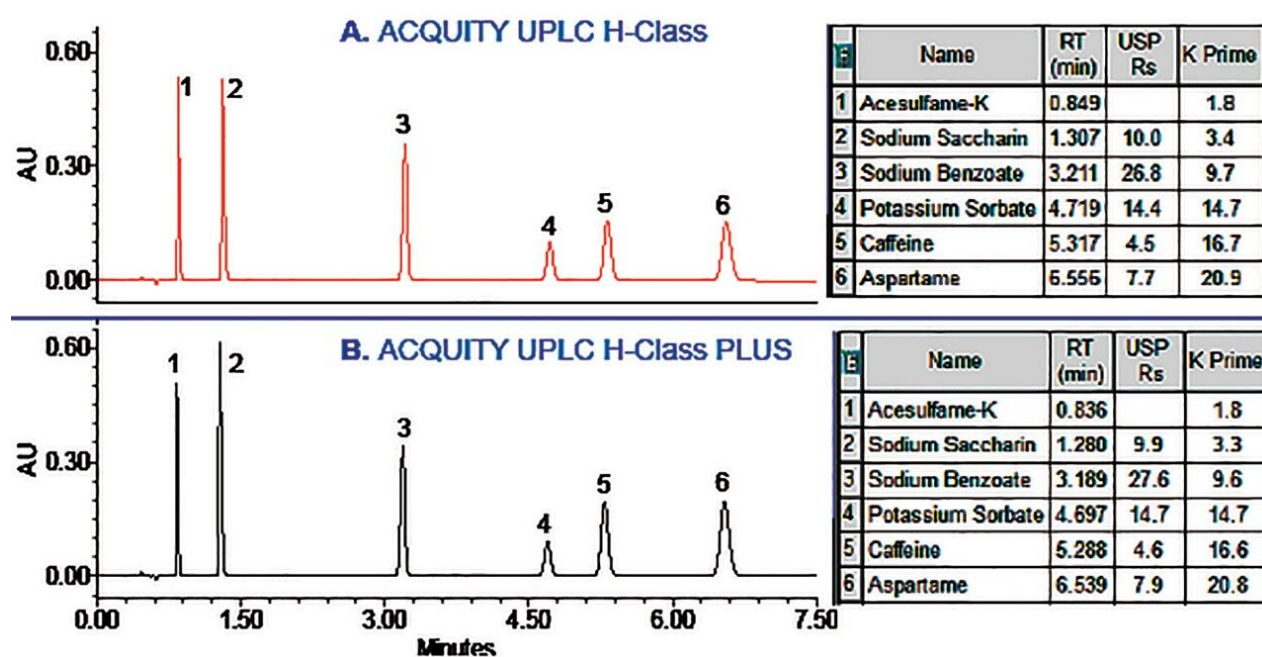


Figure 1. Chromatographic separation of beverage analysis standard acquired on an ACQUITY UPLC H-Class PLUS System with UV at 214 nm.

The standard mixture was injected seven times to evaluate performance of the method run on an ACQUITY UPLC H-Class PLUS System. The repeatability of the retention times and peak areas for all analytes are shown in Figure 2. Method exhibited excellent results with %RSD of retention times and peak areas ranging from 0.02 to 0.09% and 0.20 to 0.25%, respectively. The ACQUITY UPLC H-Class PLUS System delivered results with superior reproducibility, which is essential for manufacturers to monitor product quality during soft drink production.

Empower 3	System Suitability
Sample Set ID:	Sample Set Id 2941
Result Set ID:	Result Set Id 3082
Channel Name:	PDA Ch1 214nm@4.8nm

System Suitability Separation Results

	Name	# of Inj.	Ave RT	%RSD RT	%RSD Peak Areas	Ave USP Rs
1	Acesulfame-K	7	0.835	0.09	0.20	
2	Sodium Saccharin	7	1.280	0.07	0.21	9.9
3	Sodium Benzoate	7	3.189	0.03	0.24	27.5
4	Potassium Sorbate	7	4.696	0.02	0.25	14.6
5	Caffeine	7	5.289	0.04	0.21	4.6
6	Aspartame	7	6.539	0.02	0.25	7.9

Figure 2. Seven replicate injections of Beverage Analysis Standard acquired on an ACQUITY UPLC H-Class PLUS System with UV at 214 nm.

Conclusion

The ACQUITY UPLC H-Class PLUS System and the Waters' Beverage Analysis Kit provide a robust and reliable analytical methodology for the accurate analysis of the 'big six' additives (acesulfame potassium, sodium saccharin, sodium benzoate, potassium sorbate, caffeine, and aspartame) in soft drinks. Superior reproducibility of the system will enable manufacturers to accurately measure these ingredients during real-time process monitoring for continuous product quality. This will help to ensure that only the soft drinks batches that meet the desired specifications are delivered to the market.

References

1. Beverage Analysis Kit, Waters Care and Use Manual, 715003129, July 2015.

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

Empower 3 Chromatography Data Software <<https://www.waters.com/10190669>>

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