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Applikationsbericht

Determination of Furanocoumarins in Fruit Juice

Waters Corporation

Abstract

This application note describes the use of HPLC-UV which identifies furanocoumarins in grapefruit juice samples. Separations were performed utilizing XBridge Shield RP_{18} and XBridge C_8 Columns.

Introduction

Scientific observations have revealed evidence that compounds in several common varieties of grapefruit juice impact the oral bioavailability of some prescription drugs. For example, the furanocoumarin bergamottin and the related compound 6,7-dihydroxybergamottin have been shown to inhibit intestinal CYP3A4, a phenomenon termed “the grapefruit juice effect.” Studies have linked this inhibition primarily to fouranocoumains, the majority of which are analogues of bergamottin, 6′-7′-dihydroxybergamottin and 6′-7′-epoxybergamotting, including several dimmers of these compounds.

This report will describe the use of HPLC-UV identify furanocoumarins in grapefruit juice samples. Separations were performed utilizing XBridge Shield RP_{18} and XBridge C_8 Columns.

Experimental

Samples

The juice samples were obtained from white grapefruit. Samples were centrifuged and the furanocoumarins then extracted into ethyl acetate.

Chromatographic Conditions

Columns:	XBridge Shield RP_{18}, 4.6 x 150 mm, 5 µm p/n: 186003009 XBridge C_8, 4.6 x 150 mm, 5 µm p/n: 186003017
Mobile phase A:	2% Acetic acid
Mobile phase B:	Acetonitrile
Flow rate:	0.75 mL/min
Injection:	20 µL

Temperature:	Ambient
Detection:	UV @ 310 nm
System:	Waters Alliance 2695 with a 996 PDA Detector

Gradient:

Time	Profile	
(min)	%A	%B
0.0	90	10
15.0	80	20
20.0	75	25
30.0	60	40
55.0	30	70
67.0	5	95
80.0	5	95
85.0	90	10
95.0	90	10

Results and Discussion

Figure 1 illustrates the reversed-phase HPLC chromatograms of furanocoumarins utilizing both the XBridge Shield RP_{18} and XBridge C_8. The early portions of the chromatograms consist primarily of flavonoids, hydroxycinnamates and their related compounds. The later portions of the chromatorams are dominated by furanocoumarins which demonstrate a distinctive UV spectra with sharp adsorption wavelength maxima near 310 nm and are easily detected using PDA analysis.

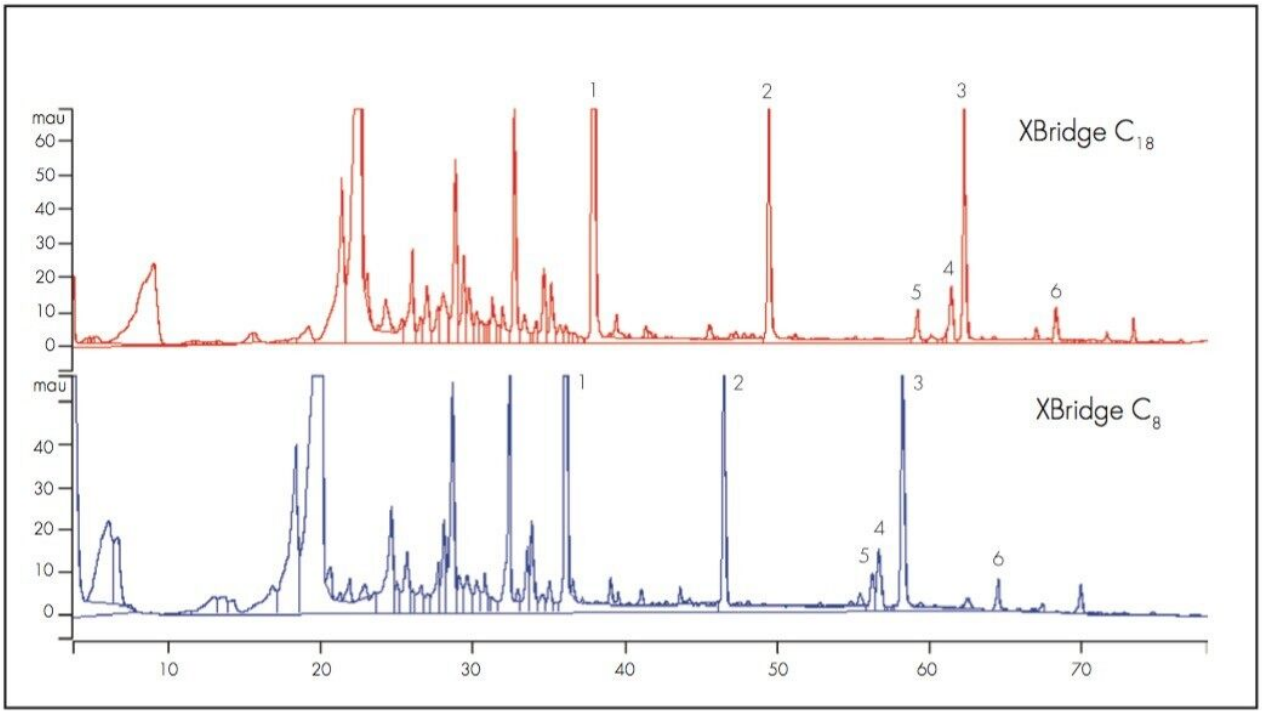

Figure 1. HPLC chromatograms of furanocoumarins in grapefruit juice.

Compounds: (1) 6,7-dihydroxybergomottin; (2) 6′,7′-epoxybergamottin; (3) bergamottin; (4) furanocoumarin dimer; (5) 7-geranyloxycoumarin; (6) furancoumarin dimer.

Conclusion

A limiting factor in the analysis of the function of specific compounds in the grapefruit-drug interaction phenomenon ("the grapefruit juice effect") is the low level at which many of the active furanocoumarins occur and the ability to accurately identify them. In this study, HPLC analysis utilizing XBridge Shield RP_{18} and XBridge C_8 Columns accurately identified these compounds of interest in a grapefruit juice extract.

References

Chromatograms courtesy of tUSDA, Agricultural Research Service.

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Alliance HPLC System <https://www.waters.com/534293>

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