DIONEX

Application Brief 117

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Determination of Cations in Fruit Juices

INTRODUCTION

Determining cations, such as potassium, sodium, and calcium, in fruit juices is important due to the dietary significance of such cations. For example, recent studies have supported the contention that excess dietary sodium is a contributing factor in heart disease. Calcium, though an important dietary component for most, can be an issue for patients with renal insufficiency. Potassium is also essential for good health and is present in significant concentrations in some juices. For these reasons, accurate reporting of cation levels is helpful.

A new and simple method to determine cations in fruit juices requires only a 1:100 dilution followed by injection. Inline sample filtration helps protect analytical columns from clogging by particulates. The method is sensitive enough to determine lithium ion concentration at low µg/L levels with sufficient resolution even in the presence of mg/L concentrations of sodium. Analysis time is 7 min or less.

A chromatogram of a representative sample is shown in Figure 1. Careful optimization of eluent concentration and column temperature would improve analyte resolution. See the IonPac® CS12A column manual, Document No. 031132-08, for information.

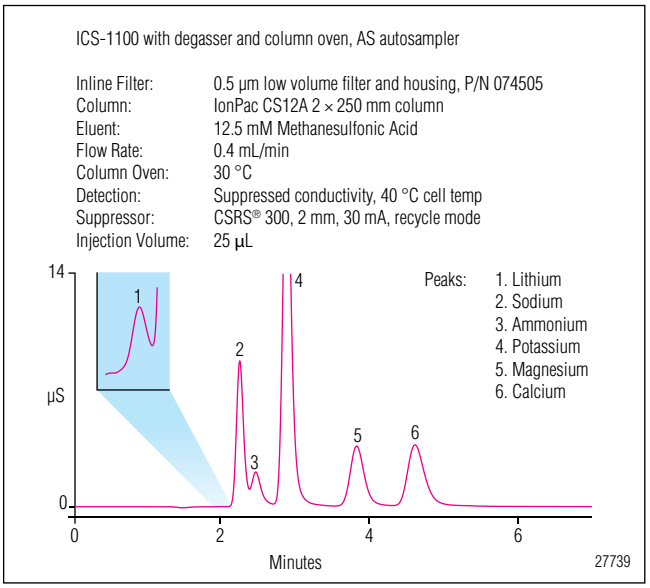

Figure 1. Example chromatogram of apricot nectar (1:100 dilution). Note lithium peak, 30 µg/L, and sodium peak, 120 mg/L.

Use of a 2 mm diameter analytical column run at 0.4 mL/min reduces eluent usage and waste by 75%, compared to the same 4 mm column application. The high-performance cation analysis column used requires only acid eluent with no added organic solvents, which are expensive to obtain and even more expensive to dispose.

Table 1. Cation Concentrations in Fruit Juices							
		Lithium (µg/L)	**Sodium (mg/L)**	**Ammonium (mg/L)**	**Potassium (mg/L)**	**Magnesium (mg/L)**	**Calcium (mg/L)**
Orange, Original Pulp Free	Average of 3 Analyses	2	3	15	1843	166	71
	Label Values				**1900**	**100**	**100**
Apricot Nectar	Average of 3 Analyses	30	120	43	575	80	79
	Label Values		**30**		**882**		
Peach Nectar	Average of 3 Analyses	29	127	20	510	81	80
	Label Values		**30**		**620**		
Lemonade with Raspberry	Average of 3 Analyses	6	11	10	193	19	28
	Label Values		**62**				
Tomato Juice	Average of 3 Analyses	4	2936	n.d.	1874	162	64
	Label Values		**2880**		**1840**		**123**
Vegetable Juice, Low Sodium	Average of 3 Analyses	14	562	30	3900	326	79
	Label Values		**491**		**3497**		
Pear Nectar	Average of 3 Analyses	31	138	n.d.	419	77	73
	Label Values		**59**		**382**		
Mango Nectar	Average of 3 Analyses	31	131	n.d.	309	71	74
	Label Values		**74**		**340**		
Guava Nectar	Average of 3 Analyses	29	131	n.d.	337	63	73
	Label Values		**29**		**250**		

Table 1 shows results of the analysis of several fruit juice samples compared to values shown on their labels. In general, the results of the ion chromatography analysis compare well with the results of the analyses reported by the juice manufacturers, thus confirming the relative accuracy of our measurements. Note the advantage of the chromatographic method, which provides results for multiple ions in a 5 min analysis.