

Determination of Cations in Fruit Juices

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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 $\mu\text{g/L}$ 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 Thermo Scientific™ Dionex™ IonPac™ CS12A column manual, Document No. 031132, for information.

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.



Thermo Scientific Dionex ICS-1100 with degasser and column oven,
Thermo Scientific Dionex AS autosampler

Inline Filter:	0.5 μm low volume filter and housing
Column:	Dionex IonPac CS12A 2 $\times$ 250 mm column
Eluent:	12.5 mM Methanesulfonic Acid
Flow Rate:	0.4 mL/min
Column Oven:	30 $^{\circ}\text{C}$
Detection:	Suppressed conductivity, 40 $^{\circ}\text{C}$ cell temp
Suppressor:	Thermo Scientific™ Dionex™ CSRS™ 300 Cation Self-Regenerating suppressor, 2 mm, 30 mA, recycle mode
Injection Volume:	25 μL

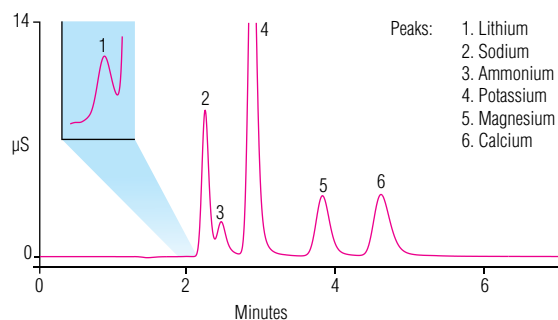


Figure 1. Example chromatogram of apricot nectar (1:100 dilution). Note lithium peak, 30 $\mu\text{g/L}$, and sodium peak, 120 mg/L .

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		

*Equivalent or improved results can be achieved using the Thermo Scientific Dionex ICS-5000⁺ system.

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