

Age Determination of Parmigiano-Reggiano Using the Hitachi L-8900 Amino Acid Analyzer

Kendra L. Cox, Ph.D., Hitachi High Technologies America

The production of Parmigiano-Reggiano is tightly regulated, resulting in a cheese of consistently high quality and cost. A lengthy aging process helps impart the cheese with a distinctive taste and texture: the minimum maturation time for the cheese is 12 months, with additional value placed on cheeses aged over 18, 22, and 30 months. The maturation process includes enzymatic conversion of amino acids, and, as such, the levels of these amino acids have been found to be correlated with the age of the cheese.¹ Presented here is a chromatographic method for amino acid analysis of Parmigiano-Reggiano using the Hitachi L-8900 Amino Acid Analyzer.

Experimental Conditions

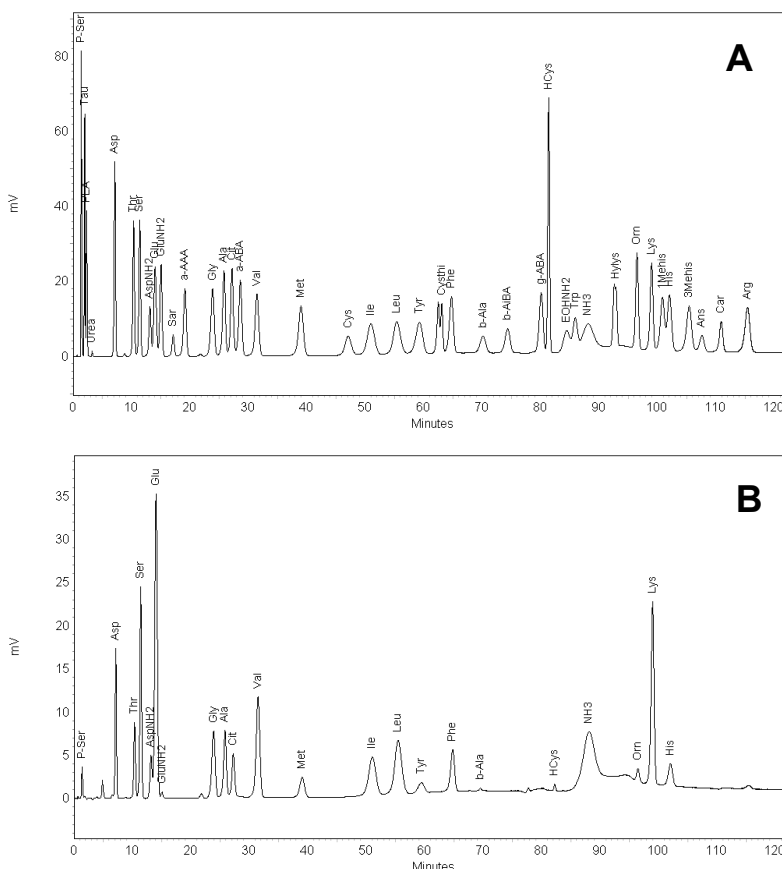
Instrument	L-8900
Columns	Separation: 6.0 x 40 mm PF column (p/n 855-4515) Ammonia Trap: 4.6 x 60 mm (p/n 855-3524)
Eluent	L-8900 PF Buffer Kit
Flow Rate	0.510 mL/min.
Temperature	32 – 70 °C
Detection	570 nm, 440 nm
Reaction Reagent	Ninhydrin buffer kit, Flow Rate: 0.45 mL/min. Reaction Column Temp.: 135 °C
Sample Preparation	0.29 g cheese dissolved in 10 mL H ₂ O and filtered through a 0.45 µm nylon filter

Results: Amino Acid Quantitation

Amino Acid	mg/g cheese	Amino Acid	mg/g cheese
Ile	4.77	Tyr	1.51
Thr	2.00	Gln	0.28
Asp	3.10	Orn	0.49
Met	1.72	Glu	15.16
Ser	4.97	Arg	0.29
Cit	2.61		

Results – Chromatographs

A. Amino Acid Standard B. Parmigiano-Reggiano in water



Discussion and Conclusion

The Hitachi L-8900 Amino Acid Analyzer effectively analyzes the amino acids in Parmigiano-Reggiano associated with cheese maturation. The average linearity (measured as R²) of peak area for amino acid standards (5 µM - 200 µM, 20 µL injections) is 0.9999. The average peak area reproducibility (% RSD) of 6 replicates of a 100 µM amino acid standard is 0.14%, and the average limit of detection (S/N ≥ 3) is 4 pmoles. The Hitachi L-8900 Amino Acid Analyzer is capable of accurate, sensitive, and reproducible measurements of the amino acids found in Parmigiano-Reggiano. As such, it is an excellent instrument for determination of any property of this cheese that can be measured by amino acid content.

Hitachi High Technologies America, Inc.

Life Sciences Division

5960 Inglewood Drive, Suite 200, Pleasanton, CA 94588

Toll Free: (800) 548-9001

 Email: Sales-LS@hitachi-hta.com Website: www.hitachi-hta.com/hplc
¹R. Consonni and L.R. Cagliani, Talanta 76 (2008) 200.