Waters
Lab Highlights
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Determination of Amino Acids in Complex Recipe-Prepared Foods

The Pico-Tag® method[1] has been widely used for the determination of amino acid composition of both protein hydrolyzates and physiologic fluids, as evidenced by the more than 500 literature citations of Waters'™ original publication in December 1984. Until recently however, the application of Pico-Tag to food samples was limited to relatively simple food matrices[2]. At the end of 1989, researchers at the University of Idaho reported that the method, with only minor modifications, had been successfully applied to ". . . the determination of amino acids, including the sulfur-containing amino acids, in complex recipe-prepared foods . . ."[3]. The foods tested included salads, sauces, casseroles, and desserts, as well as individual food items, including wheat, dried peas, legumes, potatoes, and casein. Acid hydrolysis was carried out on samples both with and without prior oxidation with performic acid (used to convert cystine to the more stable cysteic acid).

Chromatograms of a standard mixture and a representative prepared food sample (beef pepper steak) are shown in Figure 1[3].

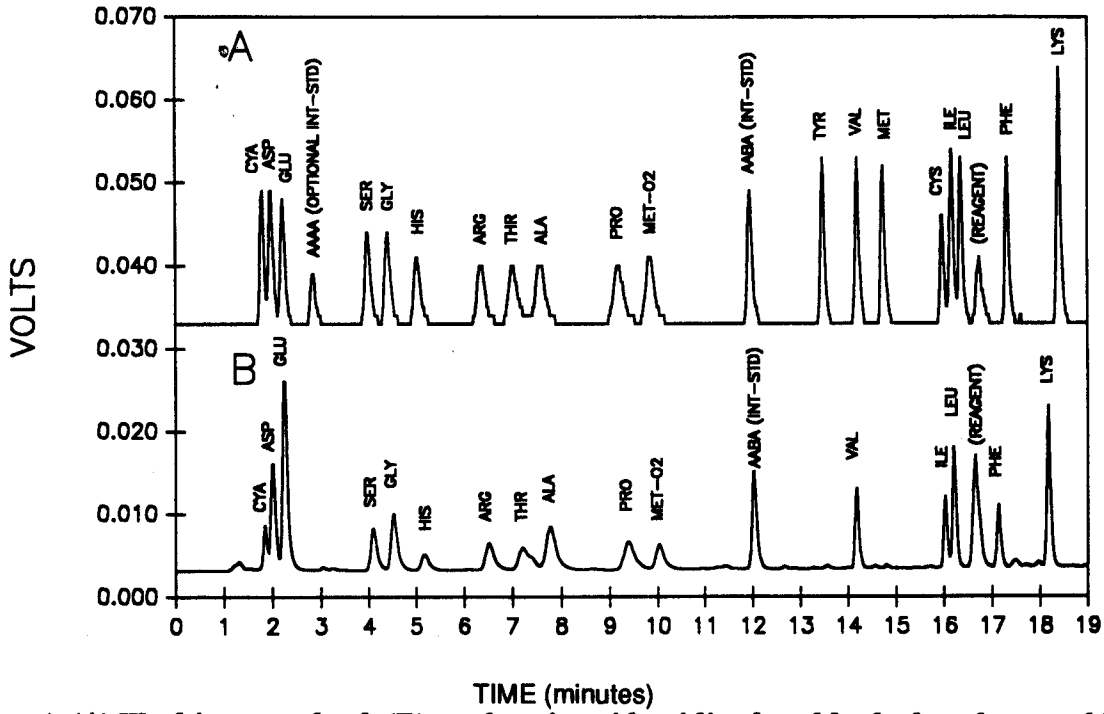

Figure 1: (A) Working standard; (B) performic acid oxidized and hydrolyzed canned beef.

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The analysis of individual food items was performed in order to allow comparison with published values. As shown in Table 1, "The amino acid contents as determined by the Pico-Tag method agree well with published values when normalized for differences in protein content. . .".[3]

Table 1: Comparison of Pico-Tag Data with Published Data for Russet Burbank Potatoes

Amino Acid	g/100g(CV) Pico-Tag	g/100g Published Value
CYA	0.113 (0.42)	0.106
ASP	2.241 (0.92)	1.963
GLU	1.630 (0.65)	1.290
SER	0.282 (8.82)	0.271
GLY	0.211 (4.79)	0.220
HIS	0.160 (4.79)	0.150
ARG	0.357 (1.12)	0.411
THR	0.249 (2.18)	0.255
ALA	0.320 (0.52)	0.216
PRO	0.254 (1.57)	0.190
MET-O2	0.100 (4.08)	0.143
TYR	0.183 (9.40)	0.326
VAL	0.498 (0.43)	0.450
ILE	0.305 (0.46)	0.298
LEU	0.428 (0.22)	0.417
PHE	0.334 (2.32)	.0317
LYS	0.479 (7.30)	0.389

The authors concluded that "The results demonstrate that it is possible to use PTC-based amino acid analysis with a variety of complex food matrices." and that "The method described is rapid and generates reproducible results which correlate well with conventional amino acid analysis."

References

1. B. A. Bidlingmeyer, S. A. Cohen, and T. L. Tarvin, *J. Chromatogr.*, **336**, 93-104, 1984.
2. See for example: Sarwar, G., Botting, H. G., and Peace, R. W., *J. Assoc. Off. Anal. Chem.*, **71**, p. 1172-5, 1988.
3. S. R. Hagen, B. Frost, and J. Augustin, *J. Assoc. Off. Anal. Chem.*, **72**(6), 912-916, 1989.

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