Accelerated Buffer System for Amino Acid Analysis

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The continual increase in sample numbers in busy labs means that it is often difficult for quality control or contract analysis labs to maintain short turnaround times, particularly when instruments are already running at full capacity. To address the need for faster analysis while retaining the quality of separation offered by dedicated amino acid analysers, an improved formulation of sodium citrate based buffers has been developed by Biochrom.

Instrumentation

The Biochrom 30 amino acid analyser is a compact bench top, PC-controlled liquid chromatography system for the specific analysis of amino acids for the pharmaceutical, proteomics, food, and feedstuffs industries.

Amino acids are separated by ion exchange chromatography and quantified using dual wavelength photometric detection following ninhydrin post column derivatization, as required by the AOAC method and the Commission Directive 98/64/EC. Because of the quality of the separation, high reproducibility of retention time and peak area, and the extensive stability of calibration, dedicated amino acid analysis has become the standard method for amino acid analysis of feeds.

Experimental conditions

The accelerated buffer system consists of a set of four buffers, with pH varying between 3.2 and 9.2, and a sodium hydroxide regeneration solution.

The accelerated buffer system is compatible with all Biochrom sodium cation exchange columns and can, therefore, be used on the Biochrom 32 oxidized protein system as well as on the Biochrom 31 protein system, with no modification of the experimental conditions except for the analytical programme. The programme was specifically developed to achieve optimum separation with the accelerated buffer system using buffer and ninhydrin flow-rates of 35 mL/hr and 25 mL/hr respectively.

Results

As shown on the standard chromatogram (Figure 1), using this improved buffer system, arginine elutes at around 45 min compared to 60 min for the original oxidized high performance system. The quality of the separation remains excellent with percentages of separation exceeding 95% for most amino acids commonly found in foods and feeds.

The system also offers more flexibility for the analysis of other amino acids of interest such as taurine, 2,6-diaminopimelic acid, ß-alanine, glucosamine, galactosamine and hydroxylysine. The complete separation of 30 amino acids is achieved in less than 50 min.

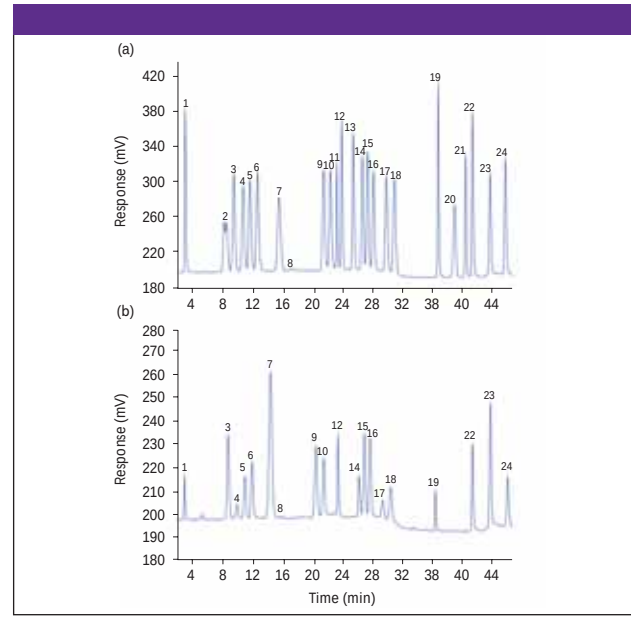

Figure 1: Chromatograms obtained on the Biochrom 32 oxidized protein system using the accelerated buffer system. (a) Chromatogram of an amino acid standard mixture. (b) Chromatogram of an oxidized protein hydrolysate sample.

Conclusion

The accelerated buffer system enables the total analysis time for a full amino acid profile to be reduced by up to 30%, which is equivalent to seven additional runs per day. By reducing the run times, the buffer and ninhydrin consumptions are also reduced. For the analysis of specific amino acids such as lysine, short programmes are also available.

The accelerated buffer system is, therefore, an attractive alternative to the classic oxidized system, particularly for laboratories for which speed of analysis is critical.

References

(1) J. Fontaine, CAB International, Amino Acids in Animal Nutrition (2), (2003).
(2) M. Davies, *The Biochrom Handbook of Amino Acids.*
(3) Lolia, Bee, and Jomah, *LCGC Application Notebook* (2004).

For a copy of the Biochrom "Amino Acid Analysis of Food and Feedstuffs" brochure, please contact support@biochrom.co.uk.

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