

CEM is the leading provider of microwave laboratory instrumentation. We have been designing and building award-winning systems for 25 years. As pioneers in the field of microwave chemistry, we have developed many of the official microwave-based methods used by internationally recognized organizations. CEM systems are the only ISO 9001:2000-approved microwave systems available worldwide. Our chemists have published articles on a number of different applications. At CEM, R&D means pioneering Research followed by inventive Development!

Every CEM instrument is backed by a dedicated team of experienced chemists and technical service personnel ready to help you. Our commitment to you doesn't end when your system is shipped: it begins.

CEM

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Discover[®] Protein Hydrolysis

***Microwave-Assisted Hydrolysis
for Amino Acid Analysis at the Speed of Light***



CEM

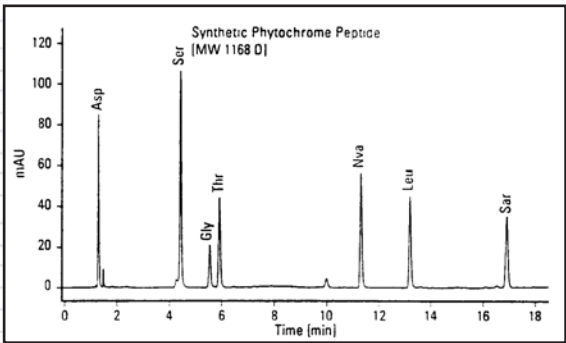
Experience the benefits of microwave-enhanced reaction rates in a microwave vapor-phase hydrolysis system.



The Discover Research System is a specially designed microwave instrument for controlling acid hydrolysis conditions. The fiber optic temperature option allows precise, direct temperature measurement and control of acid hydrolysis procedures. The 45-mL vapor-phase hydrolysis vessel allows processing of up to 10 (300-μL) samples at one time. The valve panel allows connection to a vacuum and nitrogen source. The sealed sample vessel is alternately vacuum evacuated and purged with nitrogen. Hydrolysis is performed under inert, anaerobic conditions to prevent oxidative degradation of amino acids.

Synthetic Phytochrome Peptide (MW 1168 D) SSDSTGLSTD

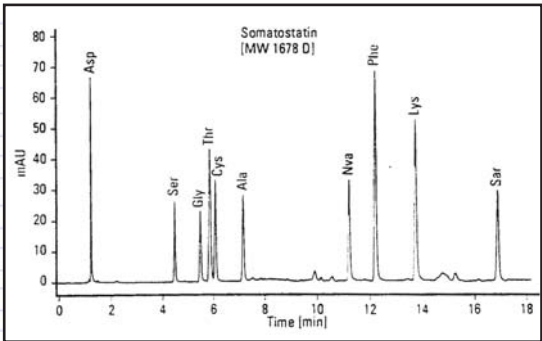
	Lit	24 hrs 110°C	90 mins 150°C	Microwave 20-25 mins 150°C
Asp	2	2.0	2.0	2.1
Ser	5	4.8	4.4	4.4
Gly	1	1.0	1.0	0.9
Thr	2	2.1	2.0	2.0
Leu	2	2.0	2.0	2.0



Synthetic phytochrome is a small peptide containing multiple serine and threonine residues. The recovery of the labile amino acids following vapor-phase microwave hydrolysis is consistent with results obtained by conventional techniques.

Somatostatin (MW 1678 D) AGCLNFFWKTF

	Lit	24 hrs 110°C	90 mins 150°C	Microwave 20-25 mins 150°C
Asp	1	1.1	1.1	1.1
Ser	1	1.0	1.0	0.9
Gly	1	1.0	1.0	1.0
Thr	2	2.1	1.9	1.8
Cys	2	1.9	2.0	1.9
Ala	1	1.0	1.0	1.0
Phe	3	3.1	3.0	2.8
Lys	2	1.9	1.9	1.8



Testing proteins and peptides containing cystine and cysteine residues with dithiodipropionic acid quantitatively converts these residues to the acid hydrolysis stable compound Cys-MPA. Accurate quantitation of Cys in somatostatin was achieved following vapor-phase hydrolysis by microwave and conventional techniques.

Vapor-Phase Microwave Synthesis

Reliable preparation of protein hydrolysates is the rate determining step for accuracy and precision in amino acid analysis. The widely used conventional protocol developed by Stein and Moore in the 1950’s involves heating samples in 6N HCL for periods of 24 hours or more.

Advances in HPLC instrumentation allow accurate analysis on minute amounts (<50 picomoles) of sample in less than one hour. Unfortunately, the improved sensitivity and separation times of amino acid analyzers are offset by the contamination, run to run variability, and time associated with conventional hydrolysis procedures.

Microwave hydrolysis represents an accurate and convenient alternative to conventional hydrolysis techniques. Protein hydrolysates can be prepared in less time than a single chromatographic run, eliminating this rate-limiting step or “bottleneck” in amino acid analysis without compromising accuracy and precision.

Microwave hydrolysis accelerates the rate of reaction without altering the fundamental chemistry of amino acid analysis. The same acids, protective agents and derivitization chemistries can be utilized in microwave hydrolysis techniques. It reduces the time required for cleavage of difficult to hydrolyze hydrophobic peptide linkages without excessive degradation of the labile amino acids: serine and threonine.

CEM’s Vapor-Phase Microwave Hydrolysis System consists of 3 major components.

Discover Research System

Vapor-phase protein hydrolysis accessory set

Fiber-optic temperature option

Teflon PFA Vessel for Vapor-Phase Microwave Hydrolysis of Proteins

In vapor-phase microwave hydrolysis, protein and peptide samples remain in the same HPLC autosampler vials throughout hydrolysis and analysis. Improvements in accuracy and sensitivity are achieved by eliminating transfer steps and the resulting sample losses and contamination.

