C190-E301

SHIMADZU
Excellence in Science

LC/MS Ultra Fast Amino Acid Analysis System

UF-Amino Station

UF-Amino™ Station

Amino Acid Analysis System Enables Both Multicomponent Analysis and Improved Throughput

A variety of separation and detection methods are used in amino acid analysis via HPLC. When multiple amino acids are subjected to a batch analysis, considerable time is required for separation, which reduces sample throughput. UF-Amino Station, which was developed in collaboration with Ajinomoto Co., Ltd., uses a special high-speed and high-separation column and the LCMS-2020 mass spectrometer, to perform batch analyses of 38* amino acids and amino acid-related components in a mere 9 minutes. Derivatization reactions are performed automatically, so tedious manual procedures are not required. UF-Amino Station is particularly effective in the field of biochemistry, where analyses of culture media, plasma, and other biological samples are required.

* Allows the analysis of 38 amino acid-related components, such as anserine, citrulline, taurine, and GABA (γ-aminobutyric acid), in addition to the 20 major amino acid components.

01

High-Speed Batch Analysis of 38 Amino Acids Can Be Performed in Just 9 Minutes

Using a special high-speed analysis column and the LC-MS, 38 amino acids can be analyzed significantly faster than with conventional amino acid analysis methods.

02

Automatic Derivatization Improves Efficiency and Reliability

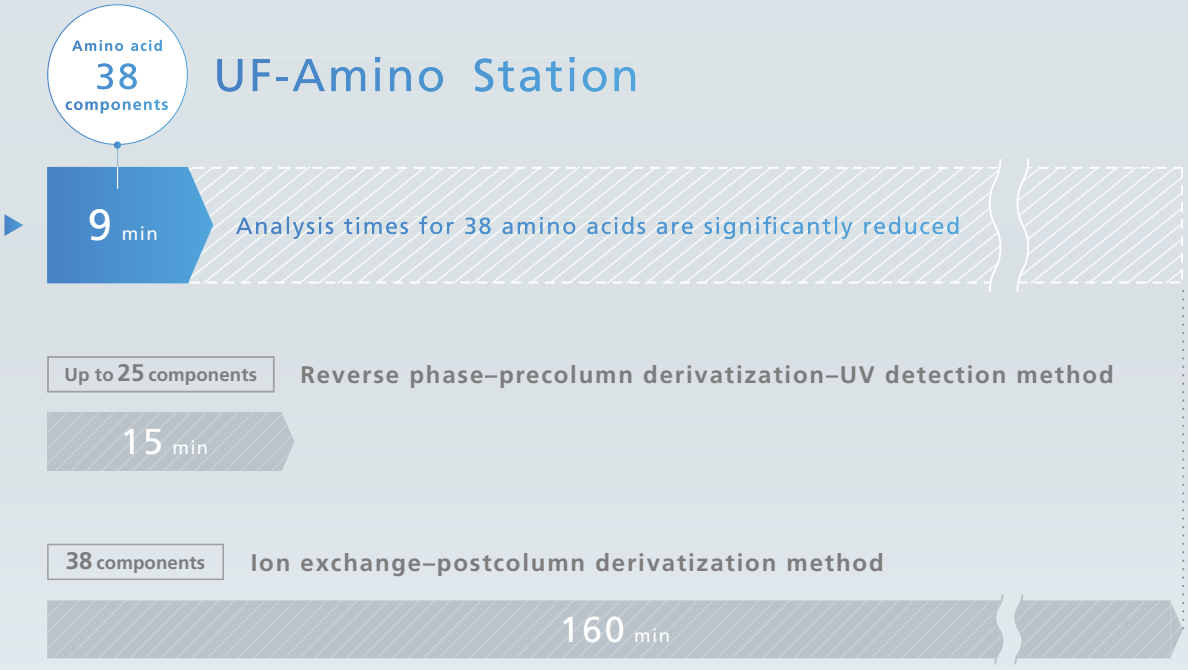
With automatic pretreatment via an autosampler, amino acid derivatization reactions can be completely automated. Automation of the derivatization reaction removes concerns about human error during the pretreatment process.

03

Smooth Data Analysis via LabSolutions Insight™

LabSolutions Insight can simultaneously display the chromatograms and quantitative results for each component in multiple data files, heightening data analysis efficiency. Reports showing tables of quantitative values and chromatograms can be easily created.

Comparison with Conventional Amino Acid Analysis Methods

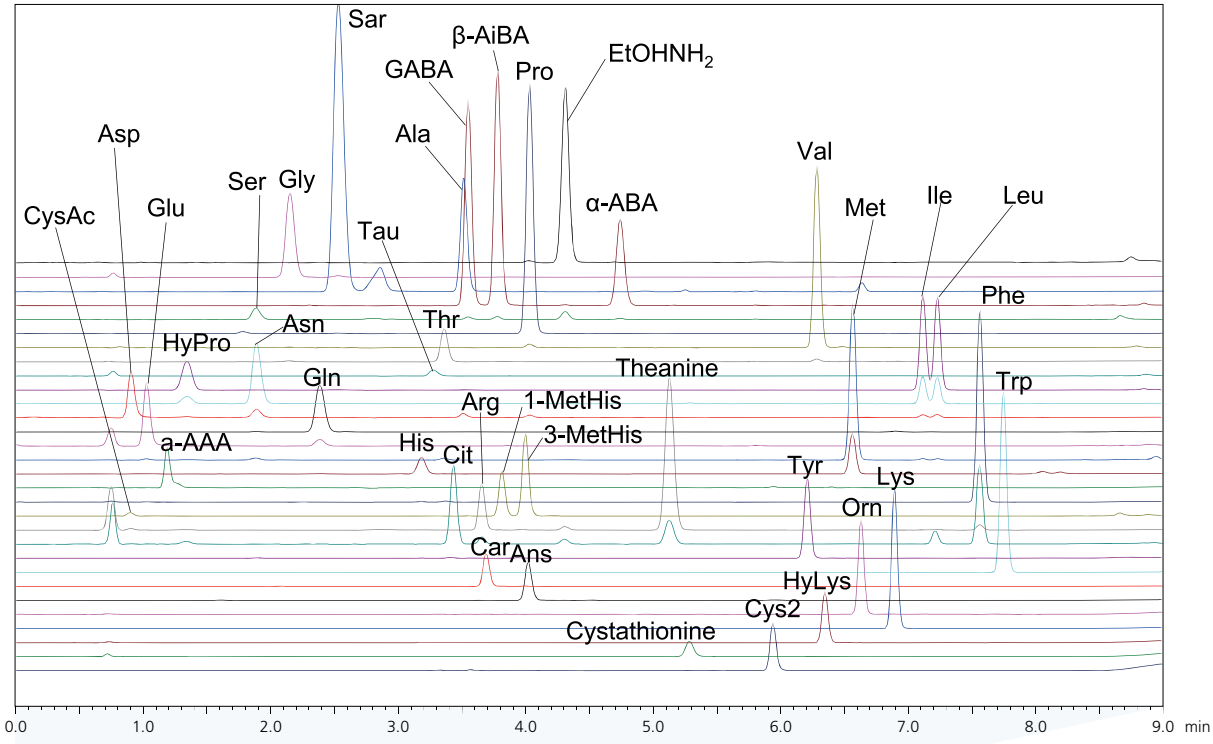


01 | High-Speed Batch Analysis of 38 Amino Acids Can Be Performed in Just 9 Minutes

High-speed separation using a special column and mass spectrometry results in the analysis of 38 amino acids and amino acid-related substances in a mere 9 minutes. This is approximately 1/18th of the analysis time of an amino acid analysis system combining ion-exchange chromatography with the postcolumn derivatization method. Up to 96 samples can be analyzed in 24 hours in sequence. The significant increase in throughput leads to excellent performance in multi-sample processing.

UF-Amino Station

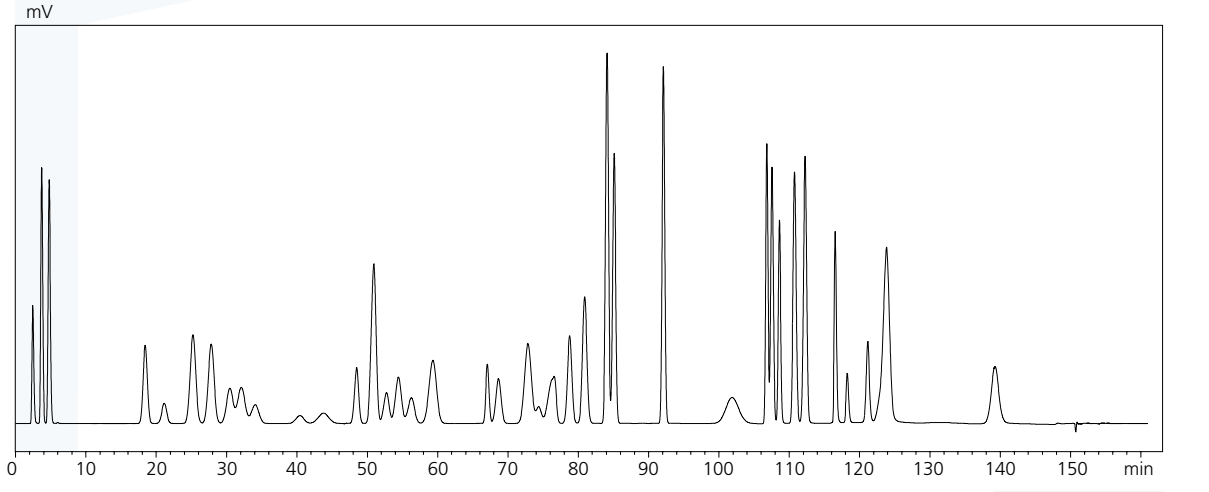
Example of the analysis of 38 amino acids using UF-Amino Station ▼



9 min

Ion exchange–postcolumn derivatization method–fluorescence detection method

Example of the analysis of 38 amino acids via ion exchange (Li)–postcolumn derivatization HPLC ▼

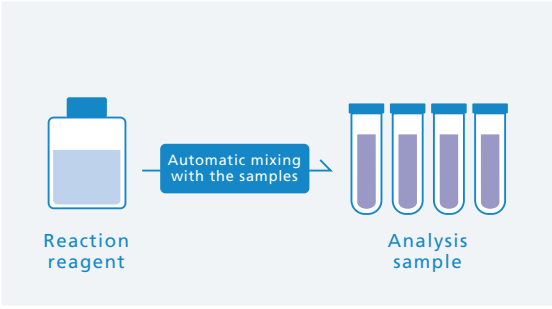


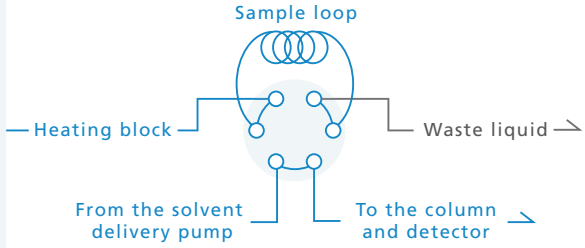
160 min

02 Automatic Derivatization Improves Efficiency and Reliability

UF-Amino Station improves the efficiency of the derivatization process via automatic pretreatment functions, while improving the reliability of the analysis results. Simply position the samples and reaction reagents in the instrument. The system then automatically performs everything from pretreatment to injection into the HPLC, reducing the work involved in pretreatment and improving reliability.

Derivatization via the Automatic Pretreatment Function





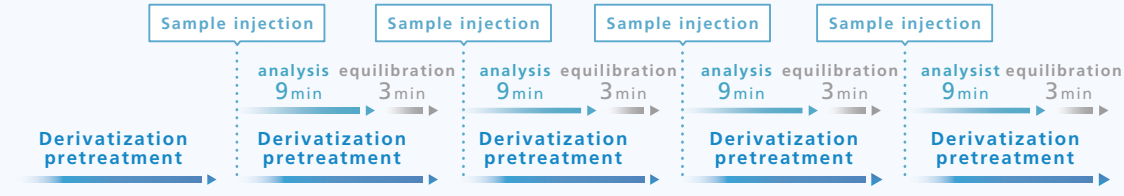
UF-Amino Station uses an autosampler pretreatment function, collects the reaction reagent and sample, and adds the reaction liquid to the mixture. The sample mixture is injected into the heating block, where it is heated and subjected to the derivatization reaction. Following the reaction, the sample is injected into the sample loop for the injection process.

Parallel Analysis and Pretreatment Heightens Efficiency

The sample solution derivatized during automatic pretreatment is injected into the column, and when analysis is started, the autosampler pretreats the next sample solution. During analysis, pretreatment for the next analysis is performed, so analysis proceeds efficiently with no loss of time, which contributes to substantial reductions in running costs and environmental load.

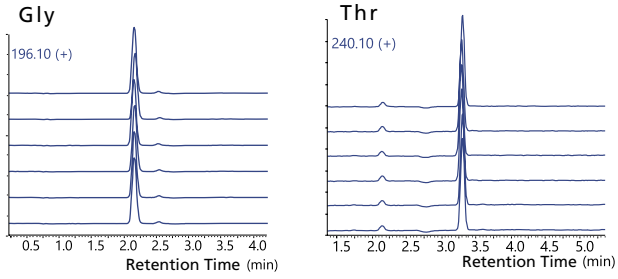
Routine Cycle

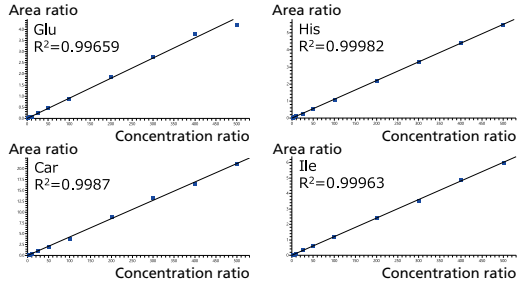
UF-Amino Station Pretreatment Cycle



Improved Reliability of Analysis Results due to Automatic Pretreatment

Adding reagents, mixing, heating, and other processes are automated, which improves the stability and efficiency of the derivatization reaction. In addition, internal standard calibration utilizing stable isotopes ensures repeatability and calibration curve linearity, so highly reliable results are obtained.



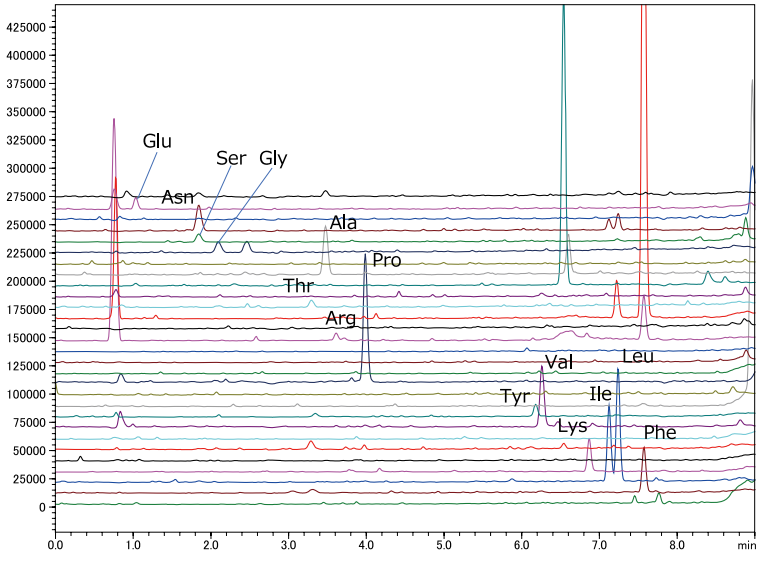


In a typical amino acid analysis, favorable linearity is obtained in the range from several nmol/mL to several hundred nmol/mL.

Area ratio and retention time repeatability (*n* = 6, 200 nmol/mL for each component)

%RSD	Asp	Gly	Thr	Arg	Val
Retention time	0.121	0.154	0.532	0.815	0.151
Area ratio	2.651	2.404	3.067	4.734	2.444

Analysis of Culture Media Solution Samples

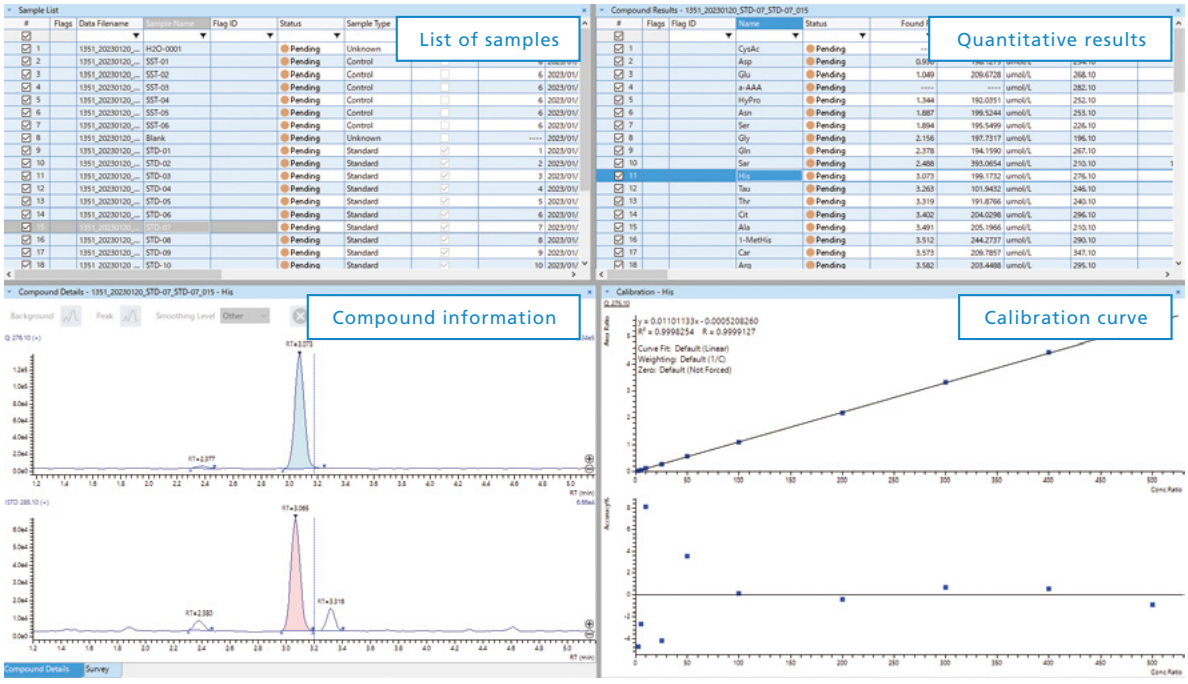


Applying the high selectivity of LC/MS, amino acids in culture media solutions that contain a number of impurities can be detected and quantitated.
Additionally, with UF-Amino Station, 38 components can be analyzed in just 9 minutes, so it can be applied to monitoring amino acid composition in multi-sample culture media solutions.

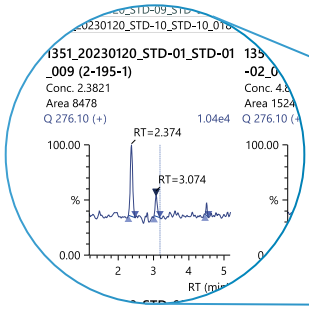
03 | Smooth Data Analysis via LabSolutions Insight

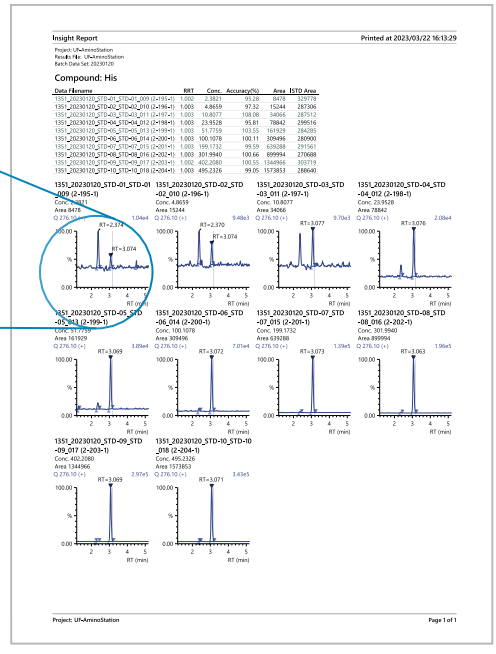
Increased Efficiency of Multi-Sample Data Analysis

With LabSolutions Insight, the window configuration can be adopted to enable intuitive operation. Users can assess the peak information and calibration curves for the selected compound at a glance, so the analysis process proceeds smoothly.



Refined Report Output





With LabSolutions Insight, report formats can be used for tabulating the required information including the chromatograms, area values, and concentrations acquired from multiple samples.
Specific amino acid analysis results can be selectively output from samples, standards, and/or controls, which reduces printing costs by creating reports suited to the desired objectives.
Additionally, the analysis results can be output in CSV format and copied into other software.

Special Shim-pack™ UF-Amino Column

The Shim-pack UF-Amino is a special column optimized for the high-speed and high-separation analysis of amino acids. A dedicated mobile phase* is used to provide excellent separation performance.

* The dedicated mobile phase and related reagents can be purchased from FUJIFILM Wako Pure Chemical Corporation.

Shimadzu Amino Acid Analysis Solutions

	LC/MS Ultra Fast Amino Acid Analysis System UF-Amino Station	Nexera Post-column Amino Acid Analysis System	i-Series Pre-column Amino Acid Analysis System	LC/MS/MS Method Package for Cell Culture Profiling Ver. 3
Analysis of amino acids from hydrolyzed protein	Excellent	Excellent	Excellent	Excellent
Analysis of free amino acids	Excellent	Excellent	Average	Excellent
Simultaneous analysis of other components	—	—	—	Excellent
Automated derivatization	Excellent	Excellent	Average	—
Analysis time	Excellent	Average	Good	Good
Analysis of samples containing foreign components	Good	Excellent	Average	Good
Reproducibility	Good	Excellent	Excellent	Good
Selectivity	Excellent	Good	Average	Excellent
Shared with other analysis	—	—	Excellent	Excellent
Utilization of installed HPLC	Good	Good	Excellent	Good
Installation cost	Good	Excellent	Excellent	Average

Please contact your Shimadzu representative for details.

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