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CHROMATOGRAPHY

AMINO ACID ANALYZER

SYSTEM S 433

- PROTEIN HYDROLYSATES
- PHYSIOLOGICAL FLUIDS
- BIOGENIC AMINES

MADE IN
GERMANY
SINCE 1984

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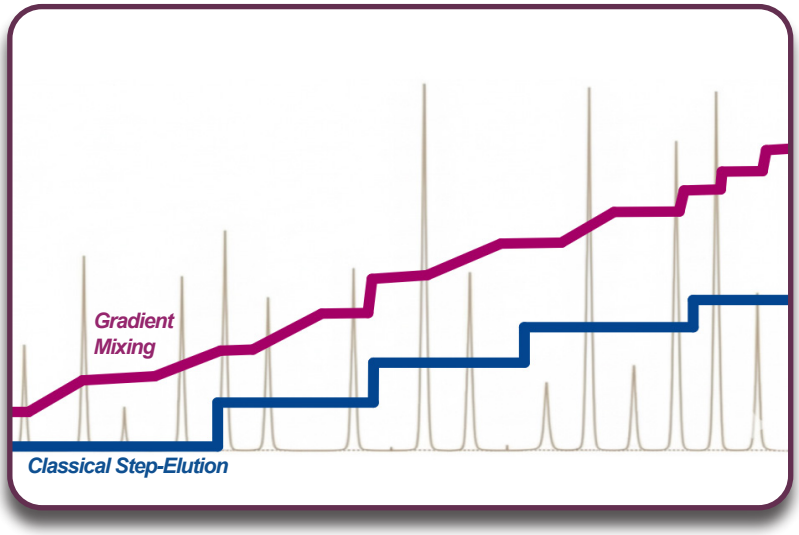
AMINO ACID ANALYZER S433

The innovative automatic ***Amino Acid Analyzer S 433*** combines the proven reliability of classical ion-exchange chromatography with the advantages of modern high-performance liquid chromatography to deliver precise and reproducible amino acid analysis. Classical amino acid analyzers based on cation-exchange separation with post-column ninhydrin derivatisation have long been established as a trusted standard for the analysis of physiological fluids as well as food and feedstuff hydrolysates and fully comply with EU Commission Directive 98/64/EC. Built on this analytical foundation, the **S 433** offers a complete, integrated solution consisting of advanced instrumentation, prepacked and tested separation columns, and optimized ready-to-use buffers and chemicals. Providing the right answer for any routine or research problem in amino acid determination.
More than 30 yearsexperience in developing and operating sophisticated amino acid analyzers results in unmatched performance.



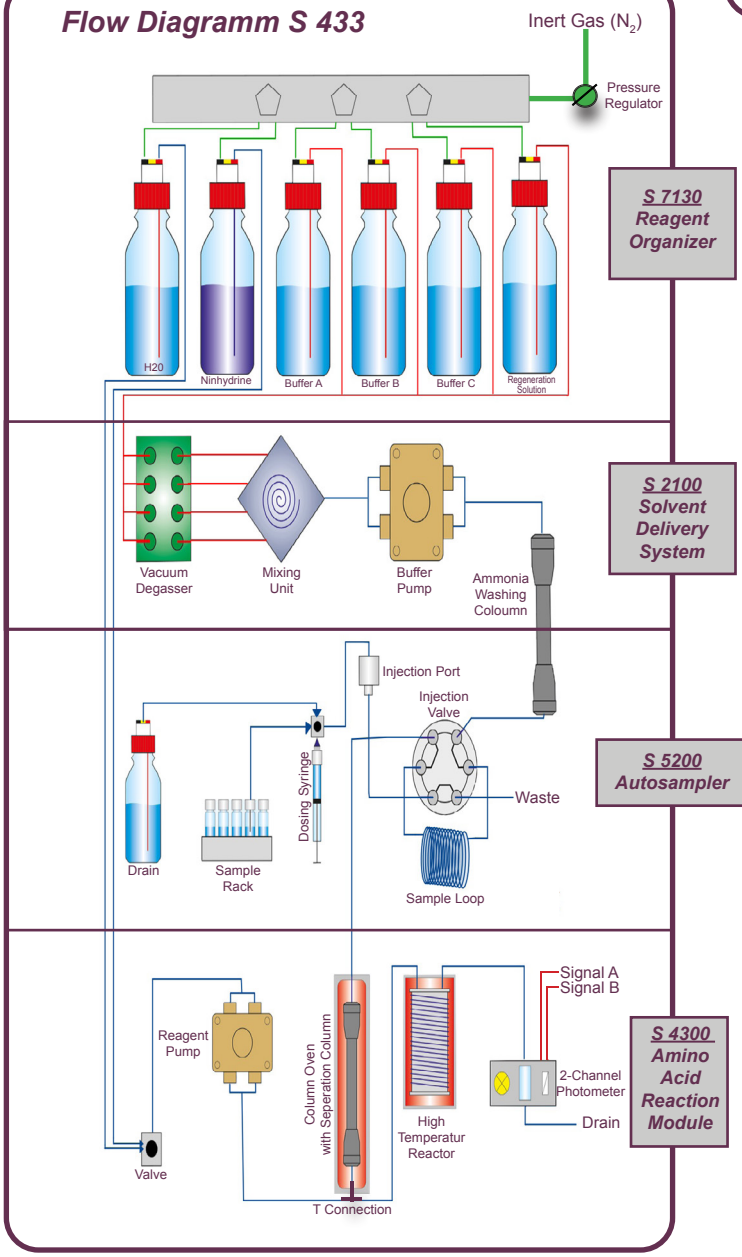
With old fashioned step-elution systems, 4 and/or 5 buffer solutions were needed. Now, due to the optimized buffer system, only 2 buffers for hydrolysates and 3 for the physiological sample are necessary. The buffer can be adjusted individually to the samples by varying the mixture of the buffer.

Pulsation-reduced solvent and Ninhydrine delivery through two independent completely inert dual-piston pumps

Cooled Reagent Storage
All buffer solutions, as well as the Ninhydrine reagent are stored under inert gas pressure in a refrigerated cabinet to avoid oxidation and air contamination independent of the ambient environment.

Multistep Separation
Only two or three buffer solutions have to be combined to form the best optimized buffer profile at any part of the separation program. No more compromises by the limitation to four or five buffer changes.

Flow Diagramm S 433



Integrated Vacuum Degasser
avoids the interruption of the buffer pump by air bubbles without the need of bubble traps with varying volumes, causing changes in retention times of the different amino acids.

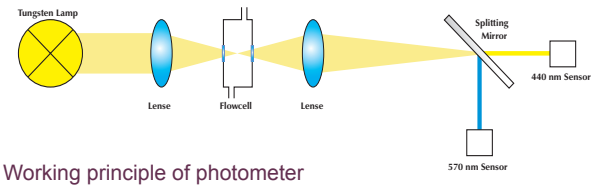
Integrated Reagent Dosing Pump
for Ninhydrine delivery and flushing of the reaction coil after each run. Programmable flow rate from 0.01 to 2.0 ml/min

Integrated Autosampler
with a capacity of 120 vials in a cooled sample tray. Volumes from 1µl to 100 µl can be injected without any loss of sample. The injected volume is adjusted by a high precision syringe, driven by a stepper motor with a resolution of 17 steps per µl.
A programmable wash program will flush the entire injection system to avoid cross contamination of the sample.

Separation Column Oven
Integrated solid state column oven with fast heating and cooling capability with a temperature range from +20°C to +99°C independent of the ambient temperature. Up to twelve programmable temperature steps can be used during one separation program.

High-Temperature Reactor
with a programmable temperature range from ambient to 180°C with a coiled capillary for the color reaction of the amino acid-ninhydrine complex. Automatic flushing of the reactor coil with a washing solution after each run prevents the blockage of the capillary.

Integrated Dual-Channel Photometer
for the amino acid detection at 440 nm and 570 nm wavelengths. Summing option for both channels, for single channel integration of all amino acids.



Working principle of photometer

Complete Inert Design
All materials coming into contact with the buffer solutions and reagents are made of inert materials as PEEK, PTFE, PVDF etc. Therefore, there is no need for using special non-corrosive buffer compositions or reagents.

Safety Devices
control pump pressures, temperatures and leakages.

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MODULAR SYSTEM DESIGN

The modular system design of the ***S 433*** enables the budget-minded buyer to use several components as parts for a standard HPLC system without further costs.

Reagent Organizer

•inert gas (N2) supply with adjustable pressure to prevent buffer/reagent oxidation and contamination

•integrated cooling

Autosampler

• only inert materials come in contact with buffer solutions & samples (except sample needle)

• exchangeable sampl loop (PEEK)

• fixed and variable volume injection mode

• integrated sample cooling

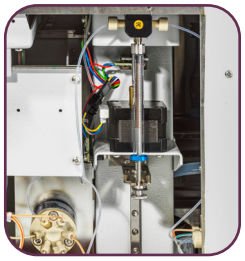
• up to 120 samples

• also usable as standard HPLC Autosampler

• optionally with pre-column derivatisation mode

Sample Racks up to 120 Samples

Exchangeable Sample Loop made of PEEK



Exchangeable Dosing Syringe

Consumables

- ready made buffer solutions (each lot tested individually)
- separation columns for a variety of applications with long term stability
- ready made Ninhydrine solution
- a variety of standard solutions

Amino Acid Reaction Module

- only inert materials come in contact with buffer solutions & samples
- integrated 2-plunger reagent dosing pump with a flow rate from 0.01 to 2.0 ml/min
- programmable reactor temperature
- integrated column oven with programmable temperature gradient and leakage sensor
- automatic washing of reactor coil with washing solution after the last sample
- integrated dual-channel photometer for the detection of amino acids at 440 and 570 nm.

Quaternary Gradient Pump

- only inert materials come in contact with buffer solutions & samples
- flow rate of 0.01 to 10.0 ml/min
- integrated 4-channel vacuum degasser
- more than 100 programmable gradient steps with a resolution of 0.1%
- two-plunger pump for smooth eluent delivery
- also usable as HPLC gradient pump

Integrated Vacuum Degasser

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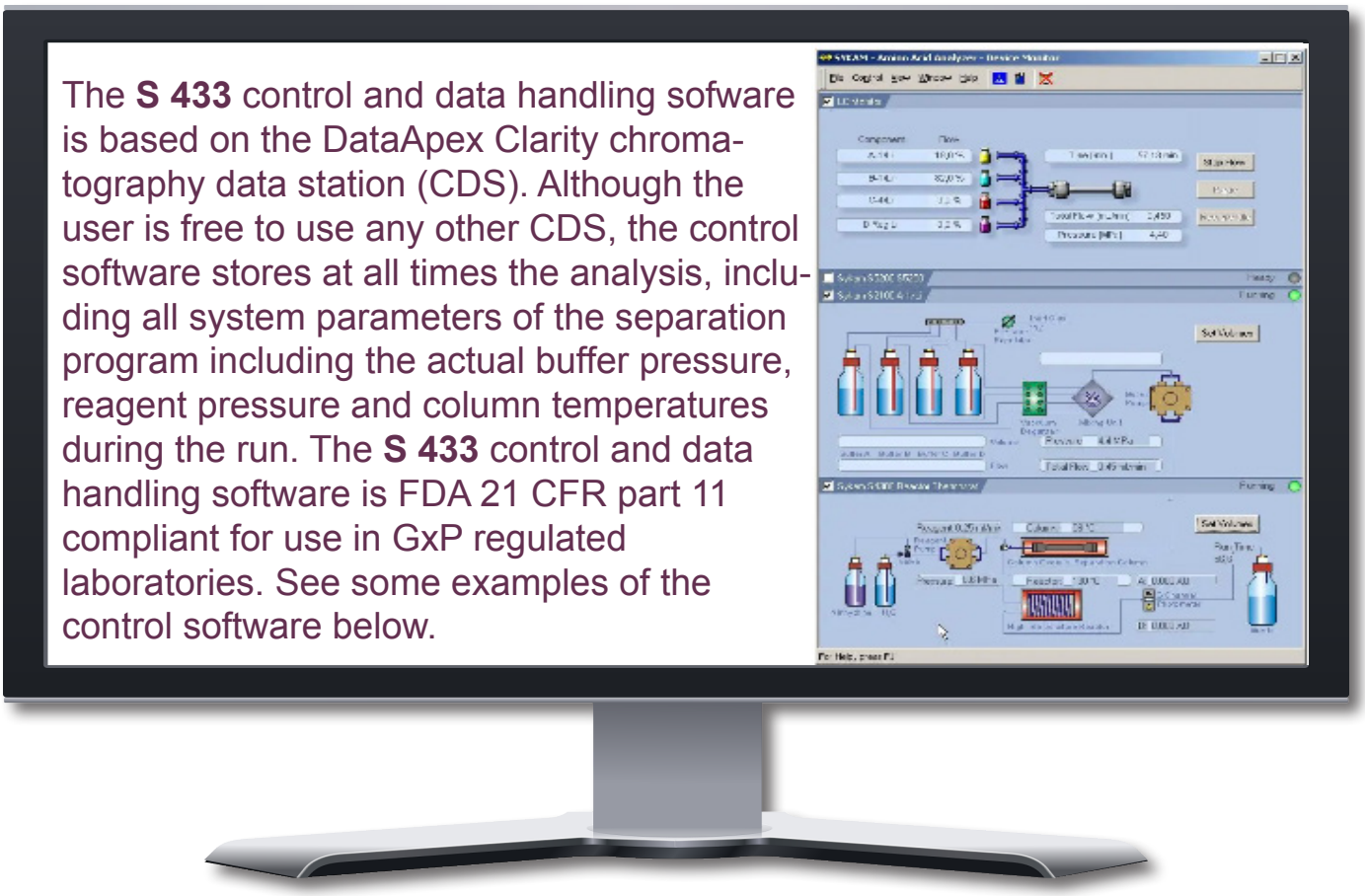
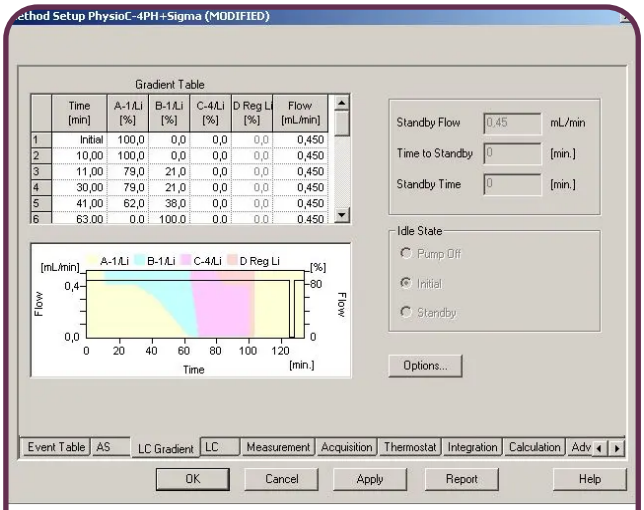
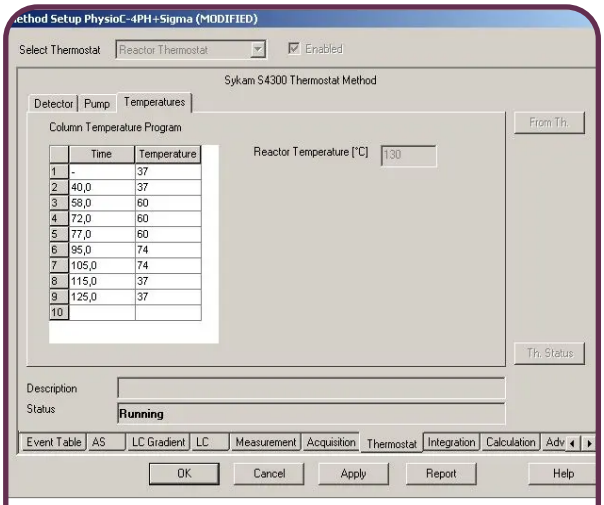
CLARITY AMINO

The **S 433** control and data handling sofware is based on the DataApex Clarity chromatography data station (CDS). Although the user is free to use any other CDS, the control software stores at all times the analysis, including all system parameters of the separation program including the actual buffer pressure, reagent pressure and column temperatures during the run. The **S 433** control and data handling software is FDA 21 CFR part 11 compliant for use in GxP regulated laboratories. See some examples of the control software below.

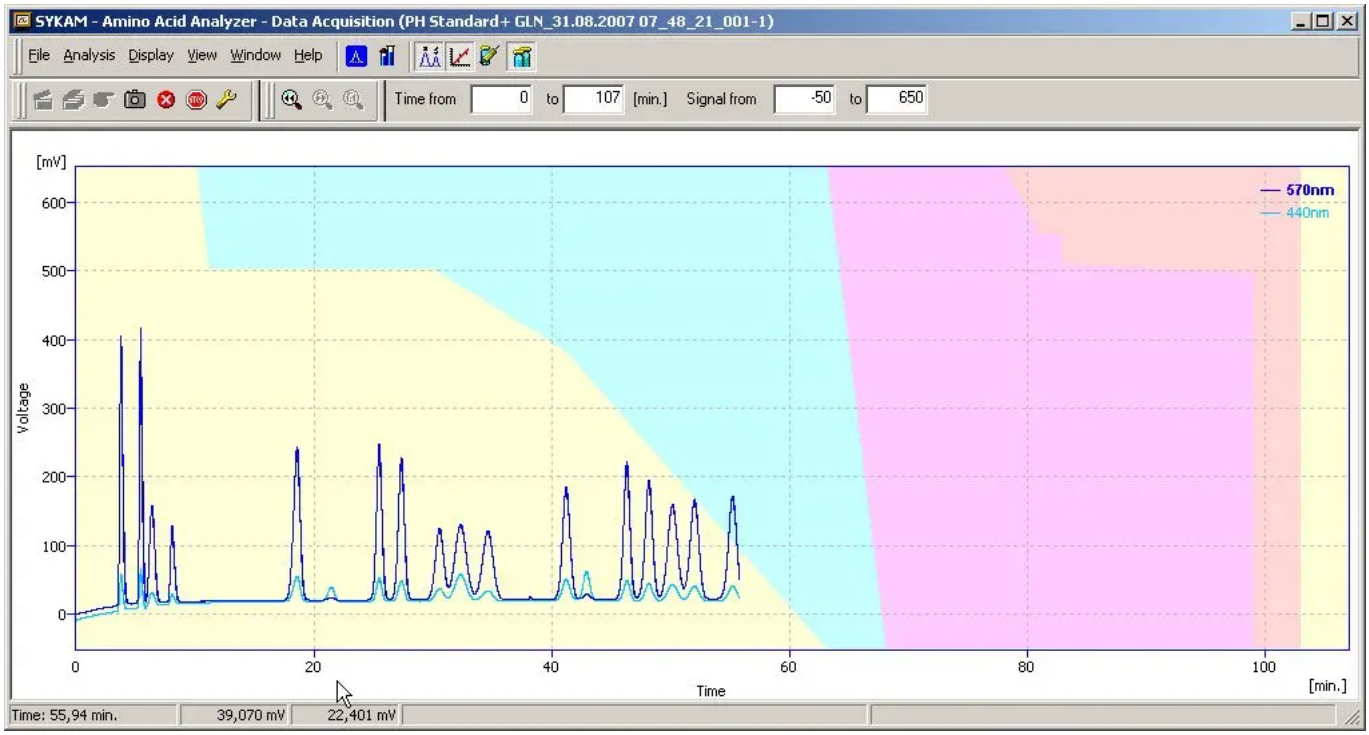




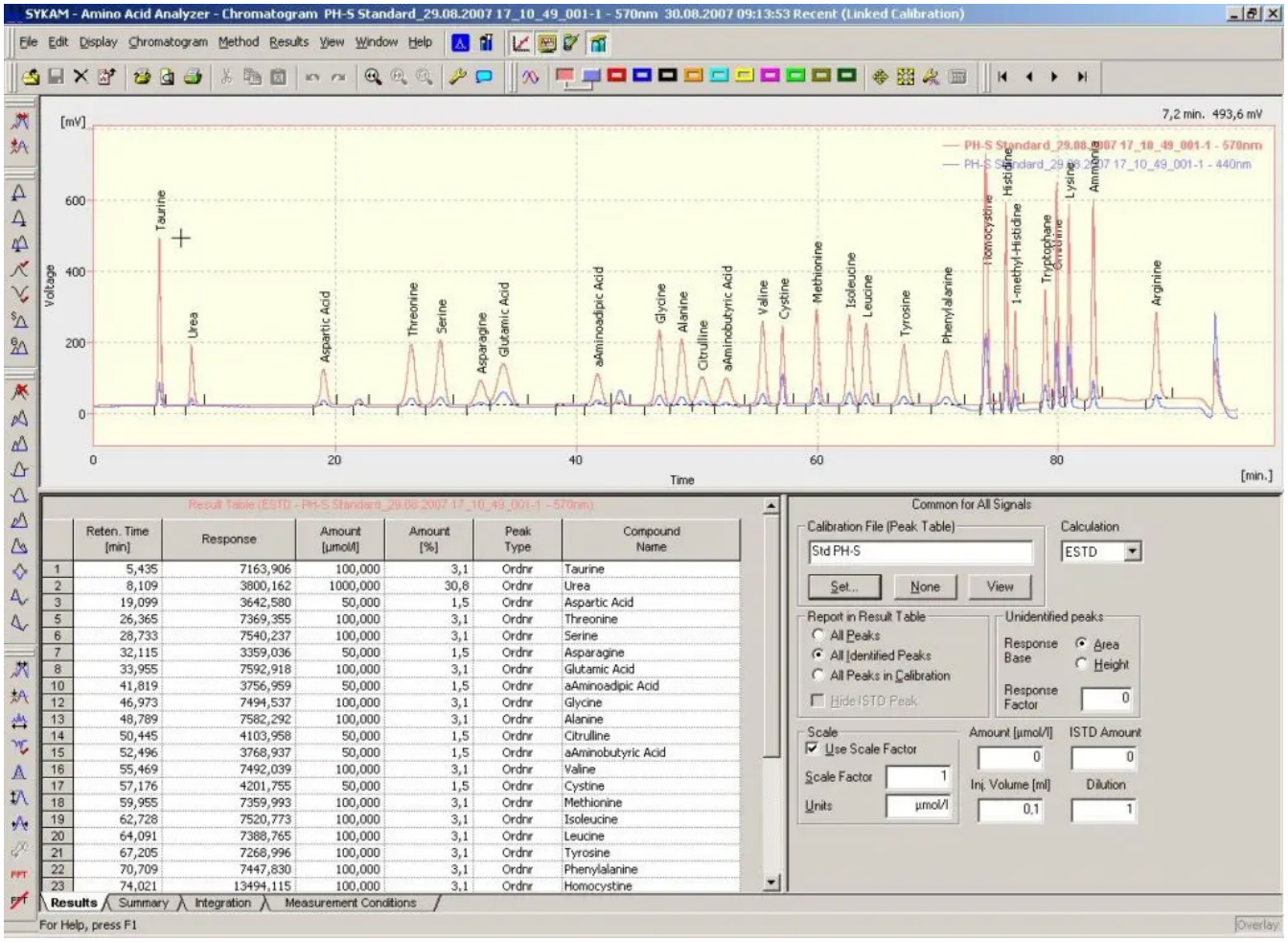
All method parameters are stored within the chromatogram datafile. Buffer gradient, column temperature gradient, integration and calculation parameters as well as the actual buffer- and reagent pressure and actual column temperature are recorded during the run. The buffer gradient program is shown here as one of the tabs of the method screen.



The coloumn temperature program.



The data acquisition screen with the actual gradient visualized with a different color for each buffer as background of the running chromatogram.



	Reten. Time [min]	Response	Amount [µmol/l]	Amount [%]	Peak Type	Compound Name
1	5,435	7163,906	100,000	3,1	Ordnr	Taurine
2	8,109	3800,162	1000,000	30,8	Ordnr	Urea
3	19,099	3642,580	50,000	1,5	Ordnr	Aspartic Acid
5	26,365	7369,355	100,000	3,1	Ordnr	Threonine
6	28,733	7540,237	100,000	3,1	Ordnr	Serine
7	32,115	3359,036	50,000	1,5	Ordnr	Asparagine
8	33,955	7592,918	100,000	3,1	Ordnr	Glutamic Acid
10	41,819	3756,959	50,000	1,5	Ordnr	aAminoadipic Acid
12	46,973	7494,537	100,000	3,1	Ordnr	Glycine
13	48,789	7582,292	100,000	3,1	Ordnr	Alanine
14	50,445	4103,958	50,000	1,5	Ordnr	Citrulline
15	52,496	3768,937	50,000	1,5	Ordnr	aAminobutyric Acid
16	55,469	7492,039	100,000	3,1	Ordnr	Valine
17	57,176	4201,755	50,000	1,5	Ordnr	Cystine
18	59,955	7359,993	100,000	3,1	Ordnr	Methionine
19	62,728	7520,773	100,000	3,1	Ordnr	Isoleucine
20	64,091	7388,765	100,000	3,1	Ordnr	Leucine
21	67,205	7268,996	100,000	3,1	Ordnr	Tyrosine
22	70,709	7447,830	100,000	3,1	Ordnr	Phenylalanine
23	74,021	13494,115	100,000	3,1	Ordnr	Homocystine

Example of a result screen.

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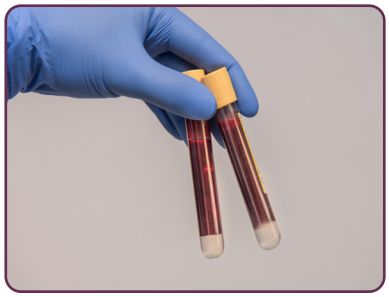
AMINO ACID APPLICATIONS

The Amino Acid Analyzer offers a high range of analysis profile from a variety of applications.

Sample Matrices

Protein Hydrolysates

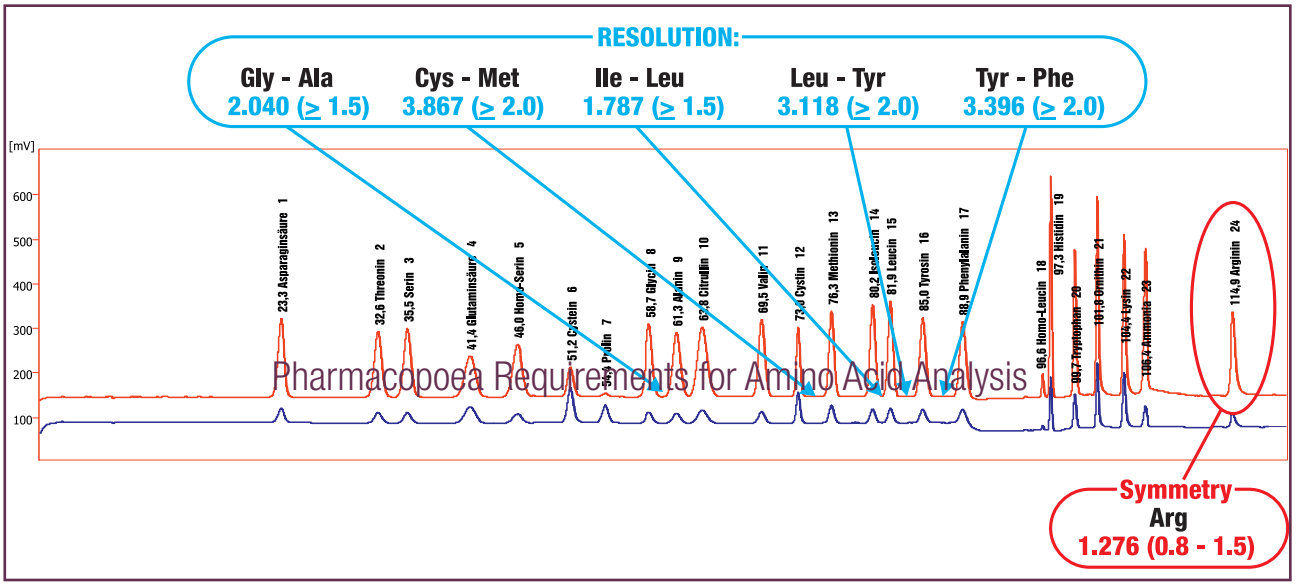


Physiological Fluids (Serum/Urine)

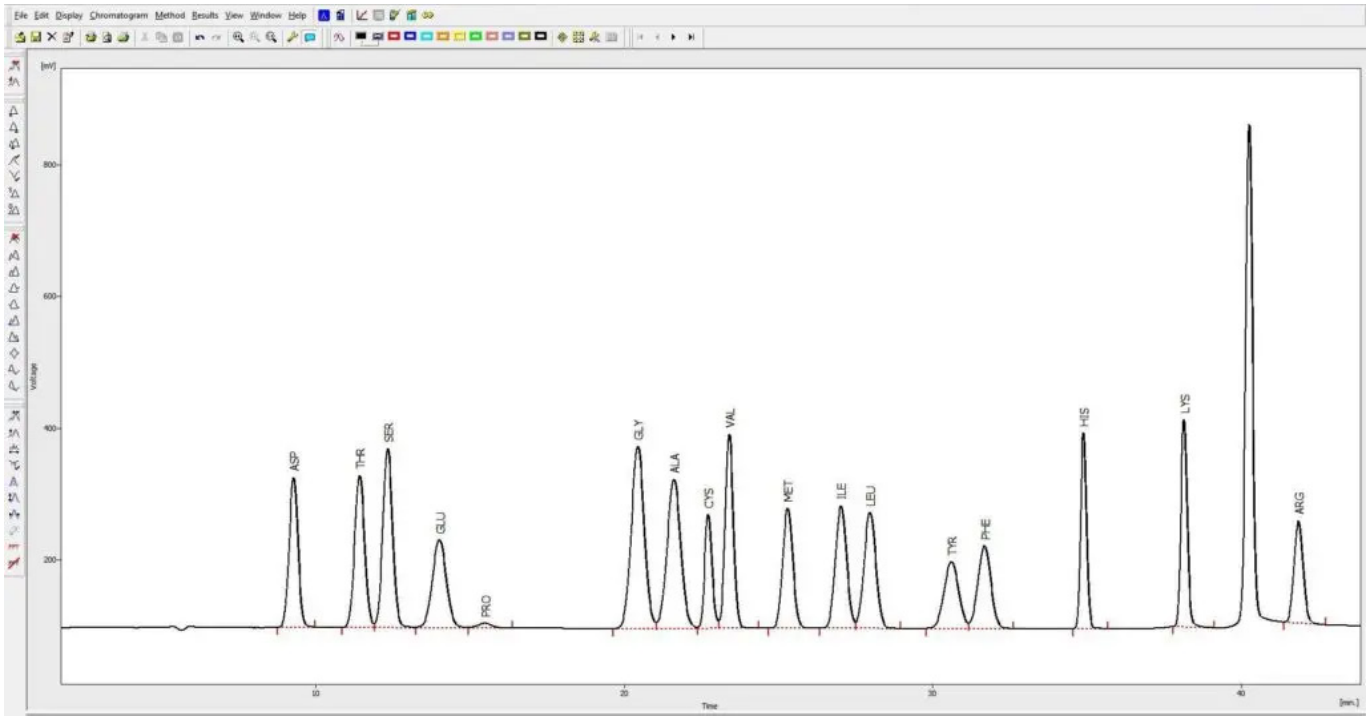
Pharmalogical Sample

Applications / Features

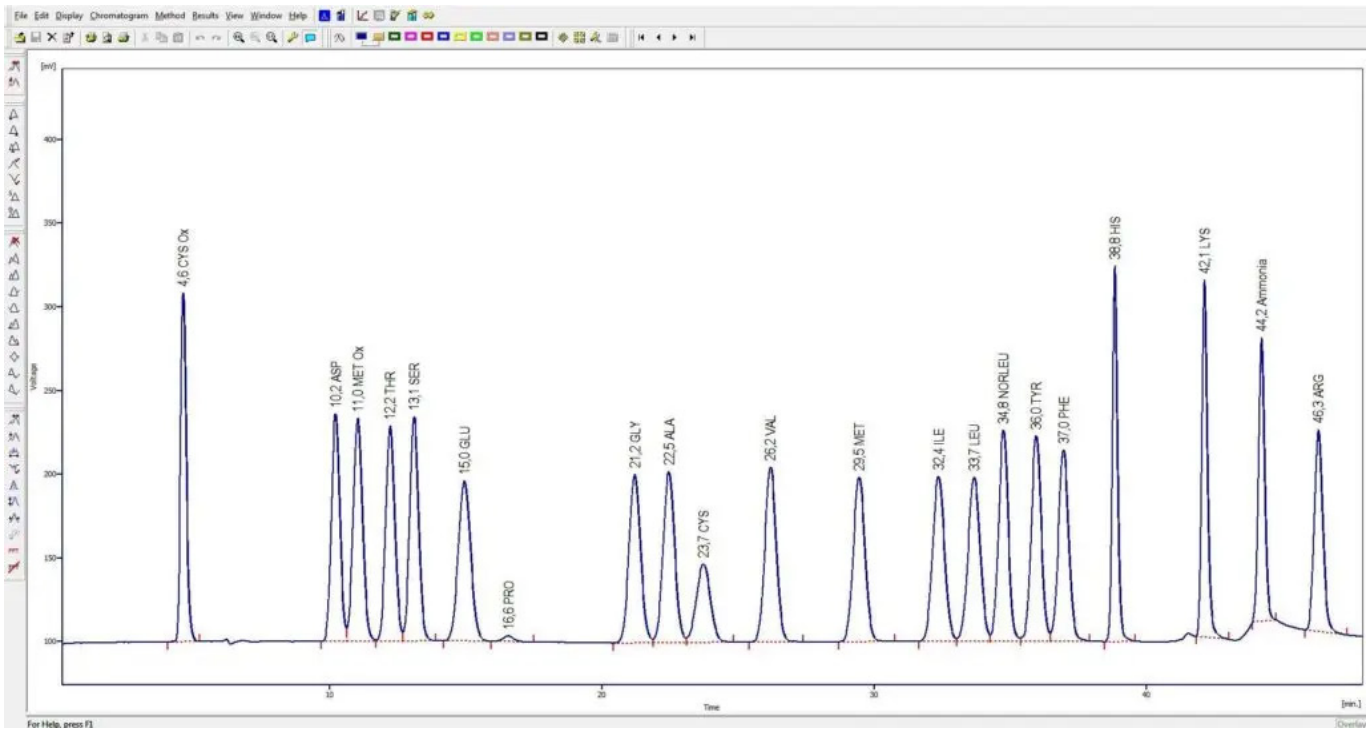
- Feedstuff
- Foodstuff
- Biogenic Amines
- Pharma Quality Control
- Pharma Conformity ***(Pharmacopoea)***



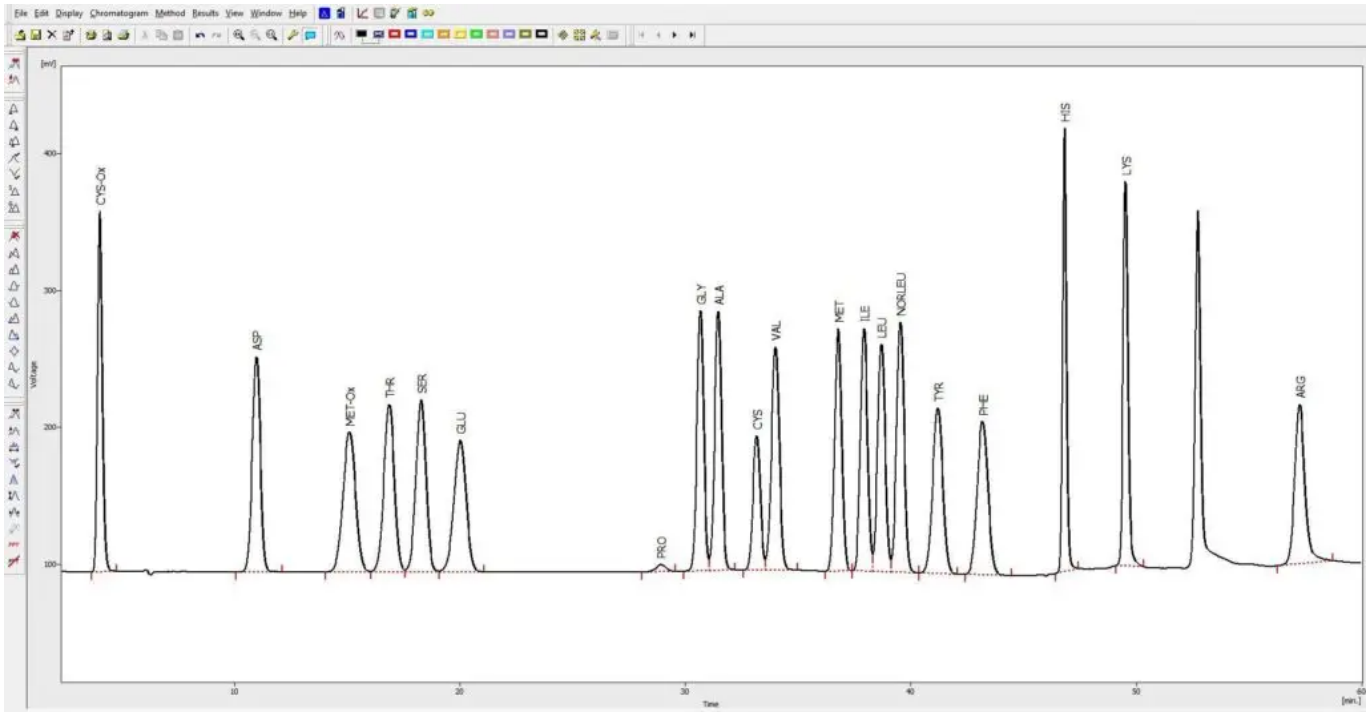
Protein Hydrolysates



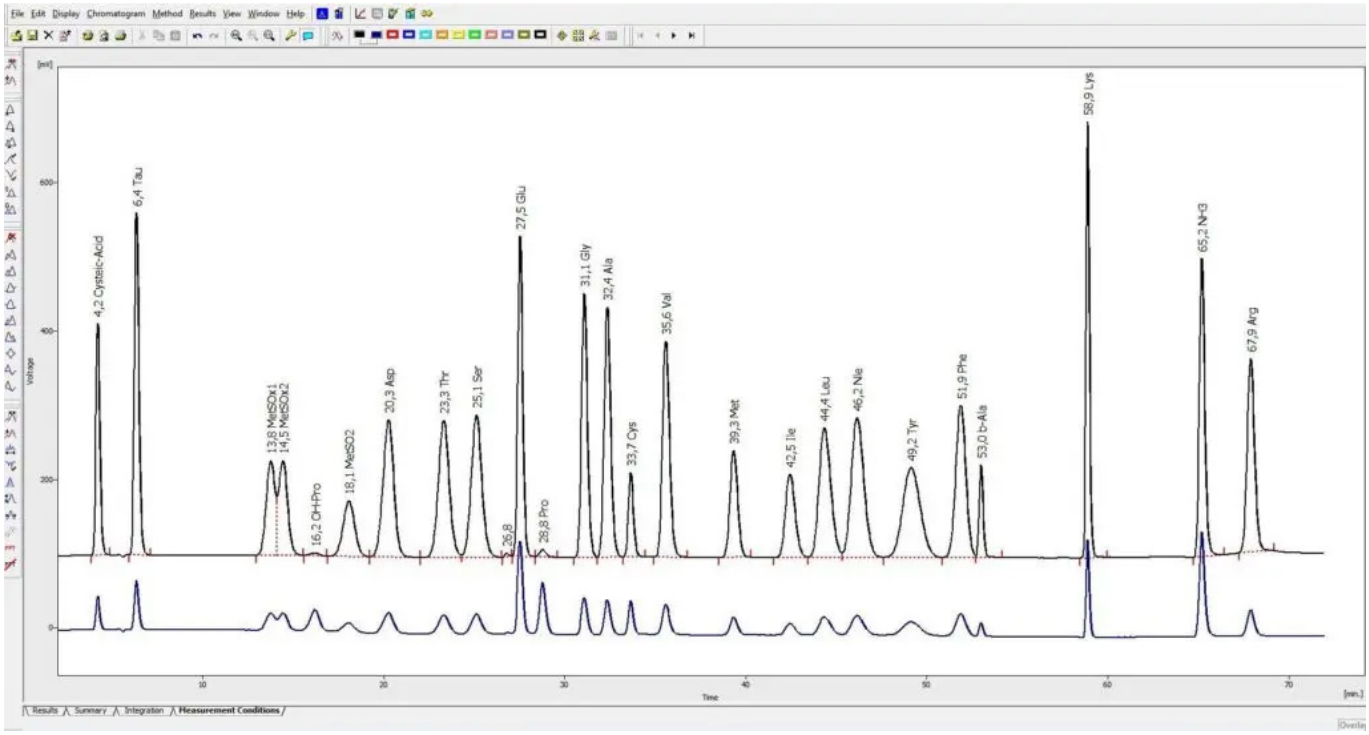
Standard Hydrolysate analysis program.
Retention time to Arginine 42 minutes. Injection to injection time 58 minutes.



Standard Oxidized Hydrolysate analysis program.
Retention time to Arginine 46 minutes. Injection to injection time 59 minutes.

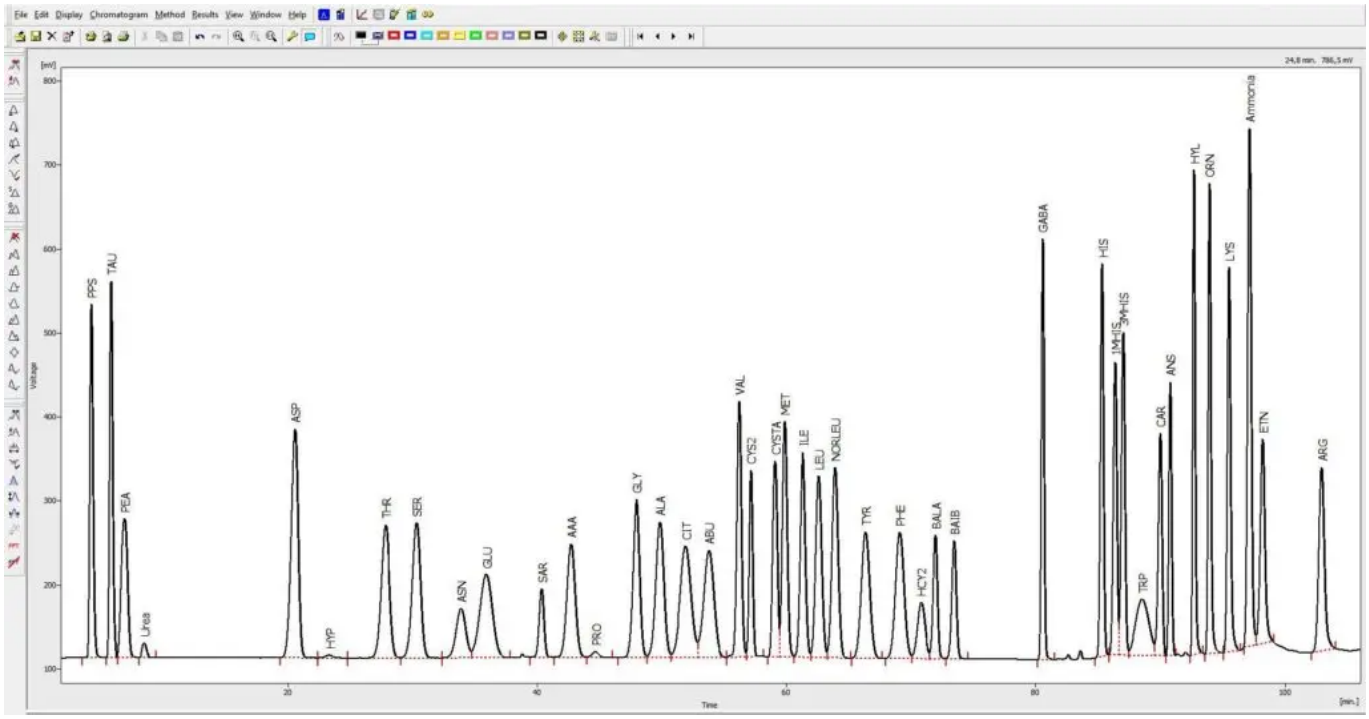


Oxidized hydrolysate program based on Lithium buffer system.
Enabling to run hydrolysate and physiological programs without changing any buffers or columns.
Retention time to Arginine 57 minutes. Injection to Injection time 77 minutes.

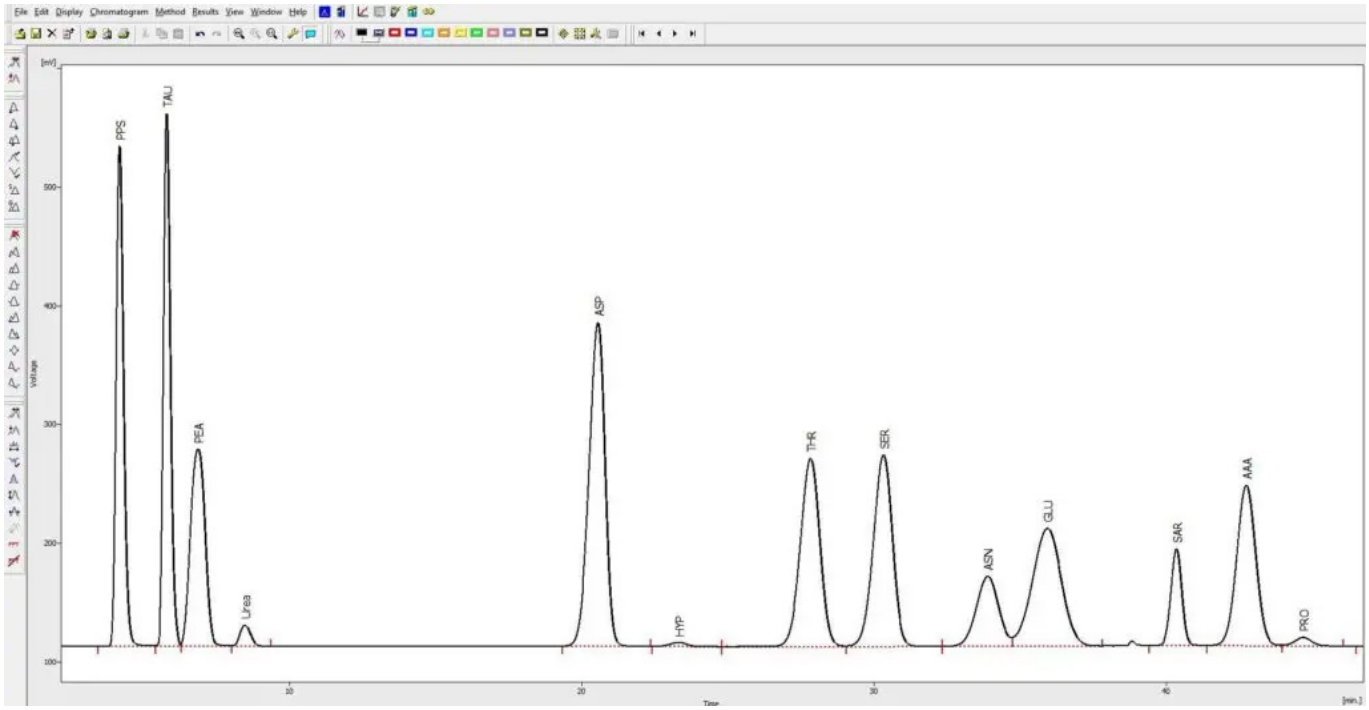


Oxidized hydrolysate program, showing 440nm channel for Hydroxyproline and proline.
Additional amino acid ß-Alanine eluting after Phenylalanine.
Retention time to Arginine 68 minutes. Injection to injection time 88 minutes.

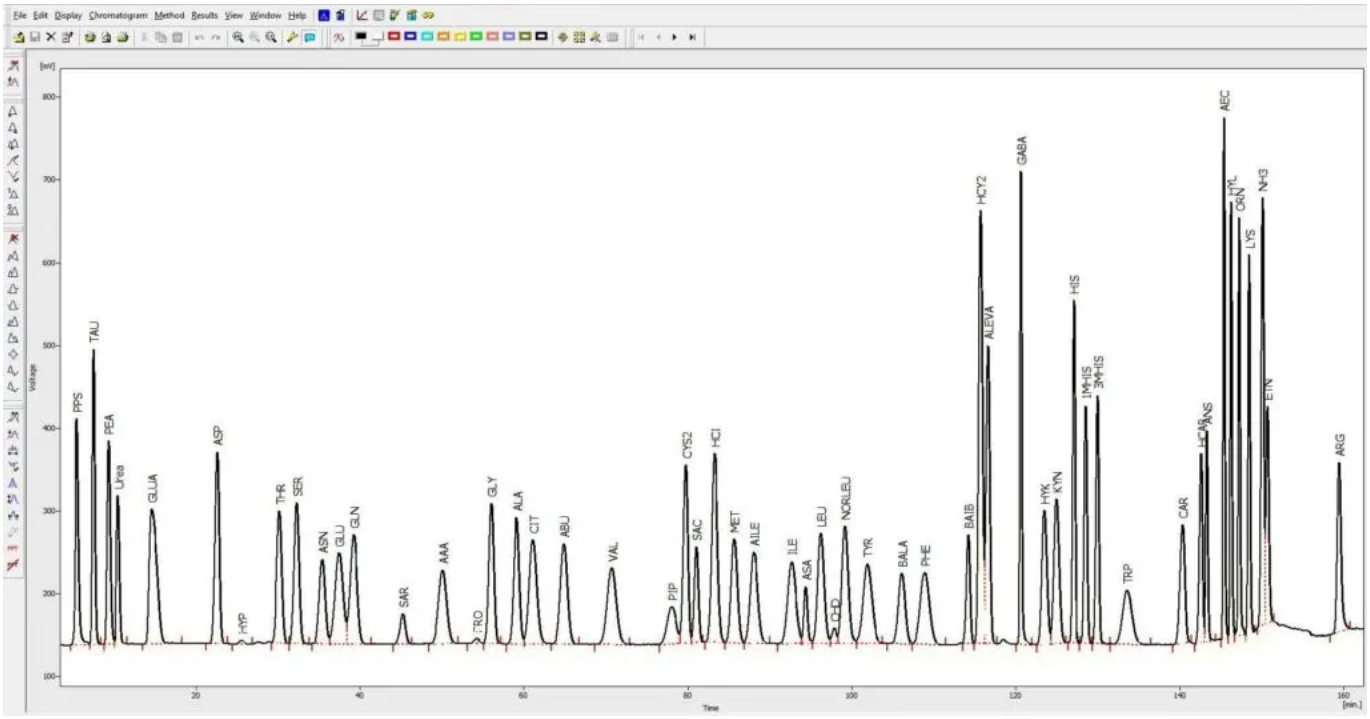
Physiological Fluids



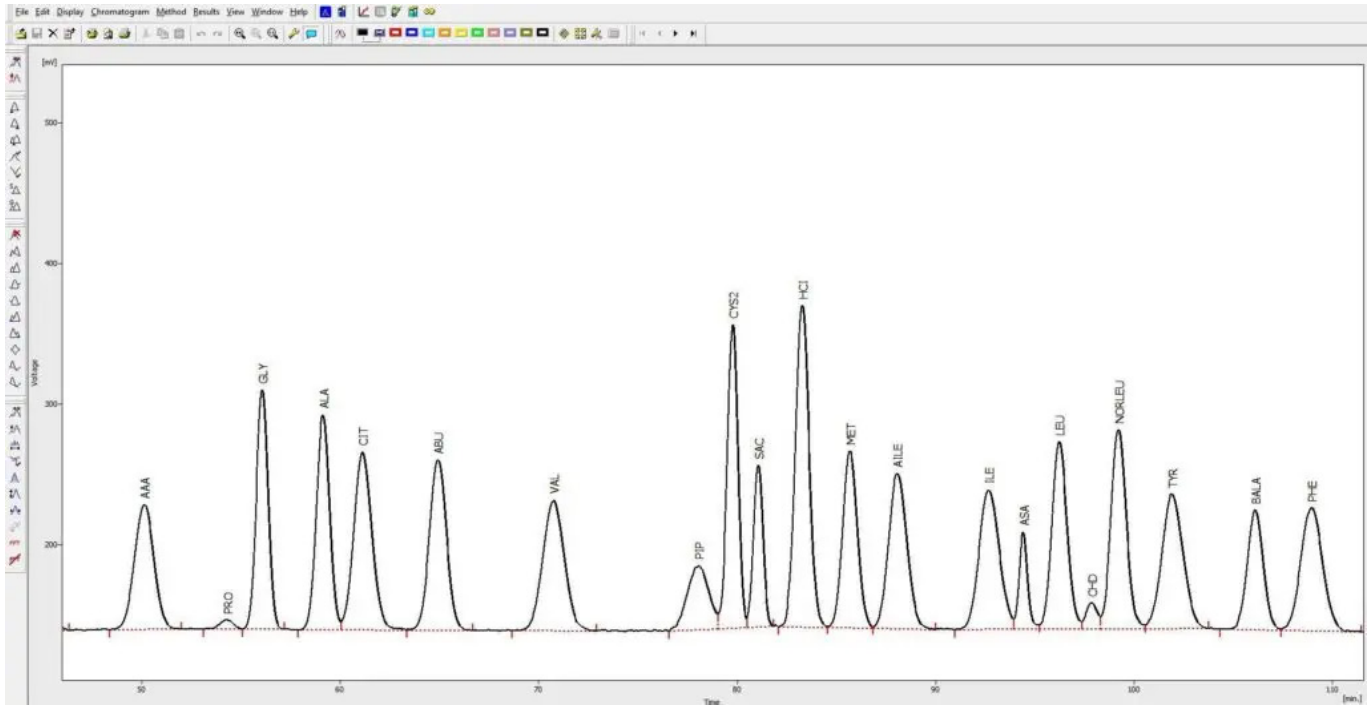
Physiological standard. Sigma Acidics/Neutrals/Basics.
Routine program with Arginine eluting at 103 minutes. Injection to injection time 128 minutes.



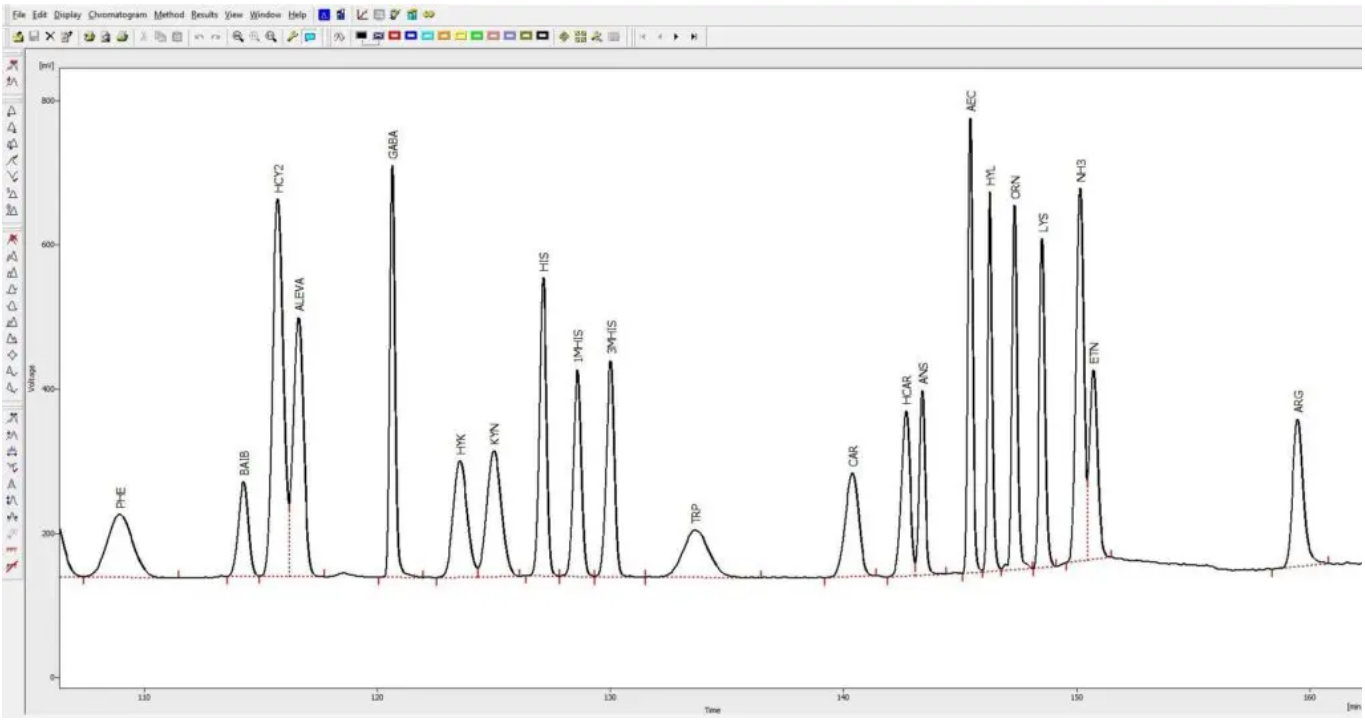
Same as above showing:
p-Ser, Tau, p-ethanolamine, Asp, OH-Pro, Thr, Ser, Asn, Glu, Sar, alpha-Aminoadipic acid, Pro.



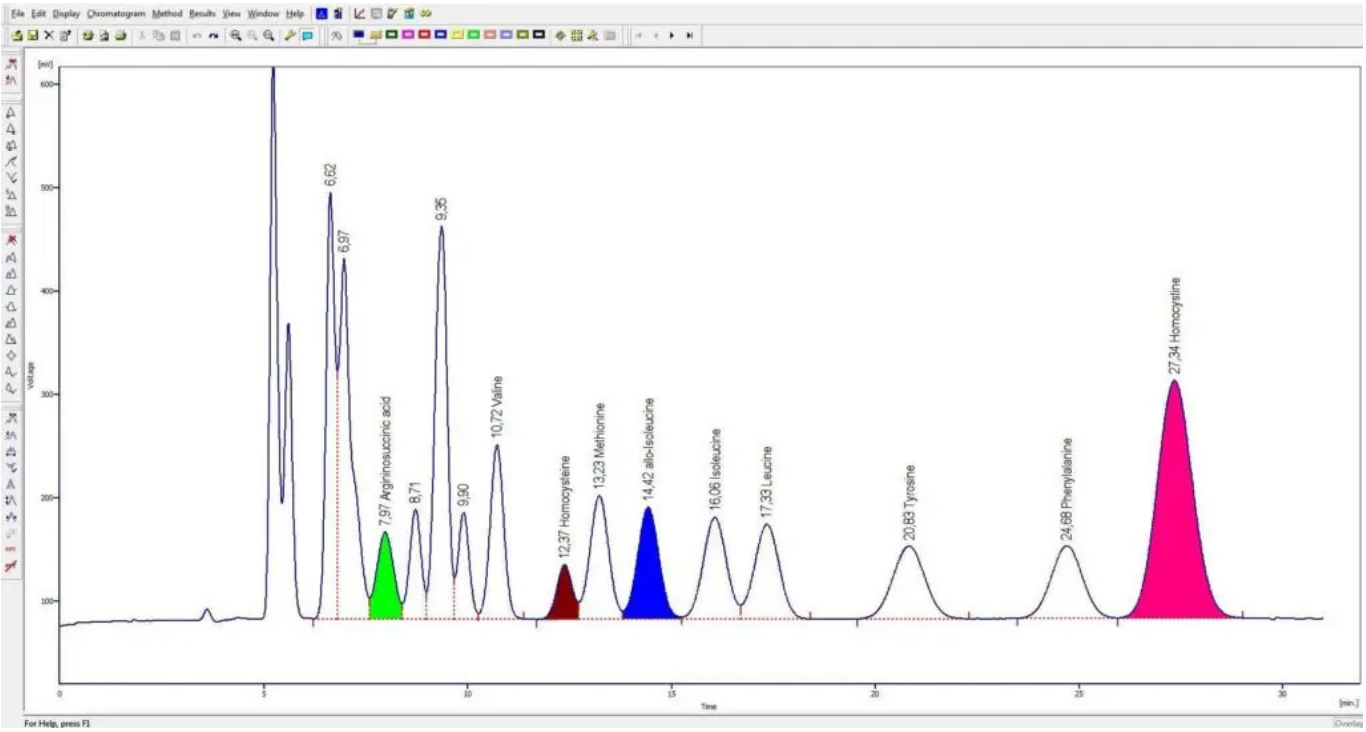
Extended Physiological program with separation of additional amino acids.
Internal standards: d-Glcosaminic acid, Norleucine, Aminoethylcystein.
Additional amino acids: Pipecolic acid, Sacharopine, Homocitrulline, allo-Isoleucine,
Arginine succinic acid, Cystine-homocysteine-disulfide, d-Amino-levolinic acid, 3-hydroxy-kynurenine,
Kynurenine, Homocarnosine.
Retention time to Arginine 158 minutes. Injection to injection time 184 minutes.



Same as above showing middle part of chromatogram. alfa-Amino-adipic-acid, Pro, Gly, Ala, Cit,
alpha-Aminobutyric acid, Val, Pipecolic acid, Cystine, Sacharopine, Homocitrulline, Met,
allo-Isoleucine, Isoleucine, Arginine-succinic acid, Leucine, Cystine-homocystine-disulfide, Nle,
Tyr, ß-Ala, Phe. Cystathionine (not present) elutes between allo-Isoleucine and Isoleucine.



Same as before, showing end part of chromatogram. Phe, ß-AIBA, Homocystine, d-Amino-levo-linic acid, GABA, Hydroxykynurenine, Kynurenine, His, 1M-His, 3M-His, Trp, Car, Homocarnosine, Ans, Aminoethylcysteine (ISTD), Hydroxylysine, Orn, Lys, NH3, Ethanolamine, Arginine.
Note: Tryptophan elutes after the histidines.



Example of a short program containing Argininosuccinic acid (RT 8.0 min), Homocysteine, Methionine, allo-Isoleucine (RT 14.4 min.), Leucine, Tyrosine, Phenylalanine and Homocystine.
Norleucine (ISTD, not present) elutes between Leucine and Tyrosine.
Time from injection to injection 44 minutes.

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TECHNICAL SPECIFICATIONS

S 2100 Solvent Delivery System

• Quaternary Pump for the reliable and reproducible mixing of the buffer solutions. All parts coming into contact with the buffers are chemically inert (PEEK or PTFE).
• dual plunger pump with special design for low pulsation (less than 1 %)
• flow range depending on installed pump head (0.01 to 10.00 ml/min)
• maximum pressure up to 350 bar (%000 PSI)
• battery buffered programs stored for the amino acid

S 4300 Amino Acid Reaction Module

• integrated 2-plunger reagent dosing pump with adjustable flow rate
(0.01 to 2.0 ml/min)
• built-in dual filter photometer (440 and 570 nm) with constant signal output and signal summary option
• programmable signal offset
• three different risetimes selectable
• temperature controlled column oven (20 to 99° C ±1° C) with active cooling capability
• temperature controlled post-column derivatisation reactor (up to 180° C ±1° C)
• automatic valve for coil flushing
• display of the actual system pressure
• safety features (e.g. leakage of reactor and column, high pressure)

S 5200 Autosampler

•for automatic injection of samples. All parts which come in contact with liquids are chemically inert and biocompatible (PEEK or PTFE).
• sampling system operating in x, y, and z-axis
• variable sample dosage without any sample loss
• loop overfill mode
• reproducibility less than 1 % upon injection of 10 µl variable volume.
• memory effect less than 0.01 % depending on the selected washing procedure
• large graphical display and keyboard for easy control
• injection volume programmable in 1 µl increments
• temperature controlled sample compartment (5 - 70° C)
• programmable washing procedure with selectable volumes
• programmable port for purging
• programmable sample sequence
• optional: pre-column derivatisation mode

S 7130 Reagent Organizer

• for storing all reagents, buffers and wash solutions.
• front side operated
• special valves for applying inert gas for oxygen-free storage

ORDER INFORMATION

Amino Acid Analyzer S 433

Catalog No	Description	Dimensions
S001570	Amino Acid Analyzer S 433 DS - Hydrolysates	S 433 for analysis of protein hydrolosates
S001638	Amino Acid Analyzer S 433 DS - Physiological	S 433 for analysis of protein hydrolosates
S003098	Amino Acid Analyzer S 433 DS - Biogenic Amines	S 433 for analysis of biogenic Amines

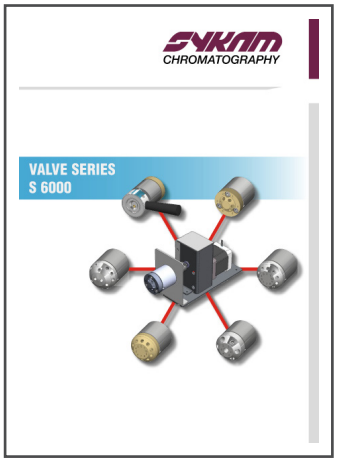
SYKAM PRODUCTS

S 150 Plus IC Systems

S 600 Series HPLC Systems

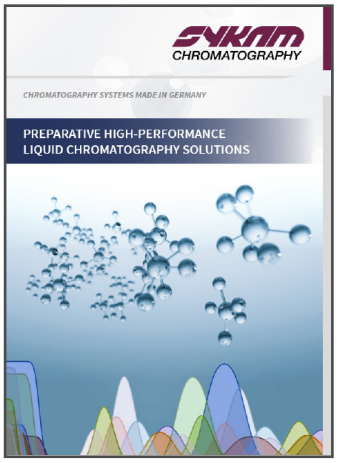
Sykam µ-Series

S 6000 Valve Series



Sykam OEM Solutions

Sykam Preparative Solutions



Discover more details and specifications at ***www.sykam.com*** or simply scan here:

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