

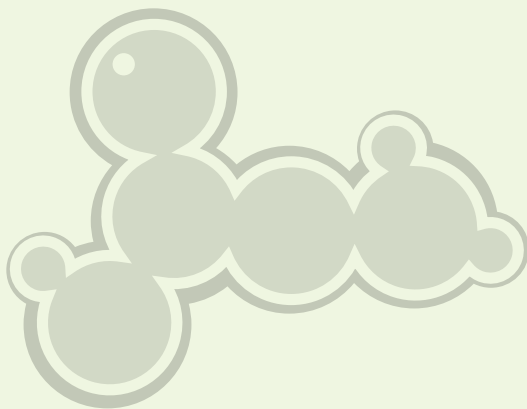


EZ:faast™

USER'S MANUAL

CE






EZ:faast[™]
CE

**Free (Physiological)
Amino Acid Analysis**
by GC-MS

USER'S MANUAL

For Part Number  KG0-7166

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 **phenomenex**[®]
...breaking with traditionSM



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EZ:faast[™] For Free (Physiological) Amino Acid Analysis by GC-MS

The following is a description of the symbols used in the EZ:faast manuals, on EZ:faast packaging, and on EZ:faast kit components.



Symbol for “In Vitro Diagnostic Medical Device”



Symbol for “Manufacturer”



Symbol for “Authorised Representative In The European Community”



Symbol for “Use By” and/or “Expiration Date”



Symbol for “Batch Code” and/or “Lot Number”



Symbol for “Catalogue Number”



Symbol for “Serial Number”



Symbol for “Flammable Substances”



Symbol for “Irritating or Harmful Substances”



Symbol for “Corrosive Substances”

zaffaastTM

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1.0 KIT COMPONENTS

1.1 Reagents

Reagent	Ingredients	Volume
Reagent 1 Internal Standard Solution	Norvaline 0.2 mM N-propanol 10%	50mL
Reagent 2 Washing Solution	N-propanol	90mL
Reagent 3A Eluting Medium Component I	Sodium Hydroxide	60mL
Reagent 3B Eluting Medium Component II	N-propanol	40mL
Reagent 4 Organic Solution I	Chloroform	4 vials, 6mL each
Reagent 5 Organic Solution II	Iso-octane	50mL
Reagent 6 Re-dissolution Solvent	Iso-octane 80% Chloroform 20%	50mL
SD 1, 2, & 3 Amino Acid Standard Mixtures	Please refer to section 4.6 in the manual	2 vials of each SD, 2mL each

1.2 Supplies

Sorbent tips in racks	4x96
Sample preparation vials	4x100
Microdispenser, 20-100µL	1
Syringe, 0.6mL	10
Syringe, 1.5mL	10
ZB-AAA 10m x 0.25mm Amino Acid Analysis GC Column	1
Autosampler vials with inserts	4x100
FocusLiners™	5
EZ:faast Demo Video and Reference CD	1
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1.3 Materials Required but Not Supplied In Kit

- 100µL-1mL pipette (SoftGrip™ pipette [Phenomenex P/N AH0-5968] or equivalent)
- 30-300µL pipette (SoftGrip™ pipette [Phenomenex P/N AH0-5967] or equivalent)
- 10-100µL pipette (SoftGrip™ pipette [Phenomenex P/N AH0-5966] or equivalent)
- Pipette tips (Phenex™ [Phenomenex P/N AH0-5917 (200µL) and AH0-5920 (1mL)] or equivalent)
- Vortex
- Vials of an appropriate volume, with caps (see section 3.2)
- Pasteur pipettes for sample transfer (see section 3.3 step 13)
- Container for proper waste disposal
- Septa (Auto-Sep T™ 11 mm [SGE P/N 041883: fits Agilent or Carlo Erba instruments] or equivalent)

2.0 OVERVIEW

2.1 Overview

The EZ:faast amino acid analysis procedure consists of a solid phase extraction step followed by a derivatization and a liquid/liquid extraction; derivatized samples are quickly analyzed by gas chromatography-mass spectrometry. The solid phase extraction is performed via a sorbent packed tip that binds amino acids while allowing interfering compounds to flow through. Amino acids on sorbent are then extruded into the sample vial and quickly derivatized with reagent at room temperature in aqueous solution. Derivatized amino acids concomitantly migrate to the organic layer for additional separation from interfering compounds. Organic layer is then removed, evaporated, and re-suspended in re-dissolution solvent and analyzed on a GC/MS system. Total sample preparation time takes around 8 minutes and analysis is performed in around 7 minutes for a total start to finish time of around 15 minutes.

A video included with this kit demonstrates the simplicity of the procedure. Please be aware that some sample preparation steps described in the video may be different than what is described in this users manual. Please use the video as a general guide, but follow the exact steps and sequence described in this manual.

2.2 Amino Acids and Related Compounds in Physiological Samples

The EZ:faast method has been developed for the analysis of more than 60 aliphatic and aromatic amino acids, including primary and secondary amines. Further amino acids and related compounds may be analyzed with this kit. A brief adjustment of gas chromatographic conditions may be necessary. Please contact Phenomenex for method modifications and other LC and GC amino acid kits. Included with the EZ:faast kit is a CD that contains spectral libraries for most amino acid derivatives as run by the EZ:faast methodology. Spectral libraries are included for Varian Saturn™ and Agilent Chemstation software systems.

Table 1 - Comprehensive list of amino acids and related compounds prepared by EZ:faast for GC/MS analysis (**internal standard listed in bold**).

Chemical Name	Abbreviation	Alter. Abb.	GC/MS Major Ions Observed (SIM) Instrument		LOD* (nmol/mL) S/N 3:1	
			Agilent 5973	Varian Saturn 2000	FID	MS
Ethanolamine			116, 117			
Alanine	ALA	A	130, 88	130, 70	1	0.1
Alliin				216, 173, 129		
Sarcosine	SAR		130, 217	130, 88	1	0.1
Glycine	GLY	G	116, 207	116, 102	2	0.1
α-Aminobutyric acid	ABA		144, 102	144, 102	1	0.2
Valine	VAL	V	158, 116	116, 98, 158	0.6	0.2
Fluoro-alanine						
β-Alanine	β-ALA		129, 158, 98			
β-Aminoisobutyric acid	β-AIB		158, 116	130, 84, 144	4	0.2
β-Amino-n-butyric acid	βABA		88, 70			
Norvaline	NORV		158, 72	158, 116		
Leucine	LEU	L	172, 86	172, 130	0.7	0.1
allo-Isoleucine	alLE		172, 130	130, 101	0.7	0.1
Isoleucine	ILE	I	172, 130	130, 101	0.7	0.2
Homoserine	HSER		102, 128, 143			
Norleucine	NLE		172, 86			
Threonine	THR	T	160, 101	101	2	0.2

Table 1 - (continued)

Chemical Name	Abbreviation	Alter. Abb.	GC/MS Major Ions Observed (SIM) Instrument		LOD* (nmol/mL) S/N 3:1	
			Agilent 5973	Varian Saturn 2000	FID	MS
γ-Amino-n-butyric acid**	GABA		130, 144, 172			
Serine	SER	S	146, 203	101, 86	2	0.2
Proline	PRO	P	156, 243	156, 114	1	0.1
Asparagine	ASN	N	155, 69	113	2	2.5
3-Methyl-cysteine			172,259,130			
Pipecolic Acid	HPRO					
Thioproline	TPR		174, 147	174, 147	0.4	0.1
Aspartic acid	ASP	D	216, 130	216, 130	0.9	0.1
Methionine	MET	M	203, 277	101, 203, 129	0.9	0.2
3-Hydroxyproline	3HYP		172,259,130			
4-Hydroxyproline	4HYP	OHPro	172, 86	172, 86	2	0.2
Phenyl-glycine	PHE-GLY					
Seleno-methionine	Se-MET					
Glutamic acid	GLU	E	230, 170	84, 142	2	0.2
Phenylalanine	PHE	F	206, 190	147, 128, 91	0.5	0.2
α-Aminoadipic acid	AAA		244, 98	98, 125	1	0.2
Cysteine	CYS	C	248, 162, 206			
4-Aminobenzoic acid	PABA		265, 206, 163			
Homophenylalanine	HPHE					
α-Aminopimelic acid	APA		198, 258, 286	198, 138, 112	0.5	0.4
Chloro-phenylalanine	Cl-PHE					
Histamine	HA		180, 168, 223			
Glutamine	GLN	Q	84, 187	84, 112	8	10
Theanine	THE		112, 215			
Bicine			290,260			
2,4-Diamino-n-butyric acid	DABA		203, 142, 245			
Glycyl-glycine (dipeptide)	GLY-GLY		117, 144, 201			
Homocysteine	HCYS		142, 203			
Methionine sulfone						
Methionine sulfoxide			229,182,138			
S-Carboxymethyl-cysteine			144,203,262			
Ornithine	ORN	O	156, 70	156, 139, 114	1	0.2
Glycyl-proline (dipeptide)	GPR	G-P	70, 300	153, 114	1	5
Tyramine			120,107,162			
Lysine	LYS	K	170, 128	153, 170, 128	1	0.2
Threonine-aspartic acid (dipeptide)	THR-ASP		218, 360, 130			
Histidine	HIS	H	282, 168	267, 222, 136	1	0.2
Naphthyl-alanine						
Seleno-cystine	Se-C-C					
Hydroxylysine (2 isomers)	HLY	OHLys	129, 169	87, 129	2	10
Tyrosine	TYR	Y	206, 107	164, 107	0.4	0.2
Diaminopimelic	DAPA		256, 168			
Proline-hydroxyproline (dipeptide)	PHP		156, 186	156, 114	0.9	10
Tryptophan	TRP	W	130	130	0.4	0.1
Lysine-alanine (dipeptide)	LYS-ALA		170, 224, 153			
Dopamine	DA		179, 136, 123			
3-Nitrotyrosine			152, 209			

Table 1 - (continued)

Chemical Name	Abbreviation	Alter. Abb.	GC/MS Major Ions Observed (SIM) Instrument		LOD* (nmol/mL) S/N 3:1	
			Agilent 5973	Varian Saturn 2000	FID	MS
Aspartame			302			
Cystathionine	CTH		203, 272	146, 114	4	10
3,4-Dihydroxyphenylalanine	DOPA		222, 123			
Cystine	C-C	(Cys)2	248, 216	114, 173	4	10
Serotonin	SRO		146,288,348			
Homocystine	HC-CH	(Hcys)2	230, 188, 128			
Arginino succinic acid	ARG-SUC		441, 326			
Ethionine	ETH		203, 291, 143			

*LODs were determined for amino acids included in standard mixtures provided with the kit

**Several amino acids coelute under the chromatographic conditions specified in the user manual (e.g. - GABA & SER)

2.3 Storage and Stability

Store Reagents 1, 3B and 4 at 4°C (do not freeze!). Store amino acid standard solutions in the freezer. All other components may be stored at room temperature. For your convenience, the bottom of the reagent box has been designed as a tray that can be easily lifted from the work station and placed in the refrigerator when the kit is not in use for an extended period of time.

All components are guaranteed for 12 months or more (see label on bottle/vial) from the date of purchase when stored at recommended temperatures and used as described in this manual. Please review the Instruction Manual included with the Drummond® Dialamatic Microdispenser for recommended usage and warranty information. Please observe recommendations for solvent bottle handling and syringe cleaning in Section 7.0 of this manual.

2.4 Safety

Although the concentration of all toxic components in any of the reagent bottles is low, for safety reasons the sample preparation station should be placed in an exhaust hood and protective gloves and goggles should be worn. When working with biological fluids, please take any necessary precautions to prevent infection with blood borne pathogens. Appropriate bio-safety precautions and disposal of bio-hazardous wastes should be followed.

3.0 SAMPLE PREPARATION PROCEDURE

3.1 Setup

The EZ:faast kit packaging has been designed as an efficient workstation. It holds a reagent tray, a vial rack, a pipette rack and a section for sorbent tips and vials. To speed up sample preparation it is recommended that the workstation be arranged as shown in figure 1a. By following directions and markings on the reagent box by breaking it along perforations it can be transformed into a reagent tray. When the kit is not in use for several days, the reagent tray (figure 1b) may be conveniently removed and placed in the refrigerator.

3.2 Preparing the Eluting Medium

The volume of prepared Eluting Medium depends upon the number of samples to be analyzed during the day (200µL/sample). The eluting medium should be prepared fresh each day:

1. Use capped vials of appropriate size (not included) for preparation of the Eluting Medium

- Combine 3 parts Reagent 3A (Eluting Medium Component I) with 2 parts Reagent 3B (Eluting Medium Component II) in an appropriate sized vial (see Table 2, page 5, for reagent volumes based on number of samples). Mix briefly.
- Store prepared eluting medium during the day at room temperature. Discard any unused mixture at the end of the day.



WORKSTATION ARRANGEMENT - (FIGURE 1)

To speed up sample preparation it is recommended that the workstation be arranged as shown below.

Figure 1a



Figure 1b



Table 2 - For your convenience check the table below to determine the volume of Eluting Medium components needed depending on your number of samples:

Number of Samples	Reagent 3A Eluting Medium Component I	Reagent 3B Eluting Medium Component II
2	300µL	200µL
4	600µL	400µL
7	900µL	600µL
12	1.5mL	1.0mL
14	1.8mL	1.2mL
19	2.4mL	1.6mL
24	3.0mL	2.0mL
29	3.6mL	2.4mL
34	4.2mL	2.8mL
39	4.8mL	3.2mL
44	5.4mL	3.6mL
49	6.0mL	4.0mL



3.3 Sample Preparation by SPE and Derivatization

Prepare Eluting Medium first; refer to section 3.2 for preparation protocol. The freshly prepared Eluting Medium vial may be placed in one of the empty slots in the reagent tray.

- For each sample, line up one glass sample preparation vial in the vial rack (Figure 2). Be aware of some variability in vial opening and sorbent tip dimensions, which may prevent the tip from reaching to the bottom of the sample preparation vial.

Note: Droplets of liquid in SPE tip or spilled sorbent particles will not affect the precision of the assay in any way.

GLASS VIAL LINE UP - (FIGURE 2)

For each sample, line up one glass sample preparation vial in the vial rack.

Figure 2



2. Pipette 100 μ L sample (serum, plasma, urine or other), and 100 μ L Reagent 1 (Internal Standard Solution) into each sample preparation vial.

Caution: The pH of biological samples is usually around 7. After the addition of Reagent 1 (Internal Standard) the mixture has the correct pH for successful loading onto the SPE tip as described in the next step. With other samples make sure that the sample + Reagent 1 mixture has a pH between pH 1.5 and pH 6.0!

Note: Samples with amino acid concentrations higher than 10mmol/L (10 μ mol/mL; e.g. dark colored urine) should be analyzed by pipetting only 50 μ L (or 25 μ L) sample in the sample preparation vial instead of 100 μ L. Concentrations recorded as a result of the GC analysis will be half (one quarter) of the actual concentrations for these samples. Conversely, when low concentrations of amino acids have to be quantified, the volume of sample to be prepared should be 200 μ L or more. **The total amount of amino acids present in the sample to be loaded onto the SPE tip should not exceed 1.2 μ moles.**

3. Attach a sorbent tip to a 1.5mL syringe and loosen the syringe piston; immerse the tip and let the solution in the sample preparation vial pass through the sorbent tip by SLOWLY pulling back the syringe piston, in SMALL steps.

Caution: Do not quickly pull back the piston. Try to take at least one minute to pass low viscosity sample (such as urine or standard) through the sorbent tip. For very viscous samples like concentrated plasma, up to 200 μ L of water can be added to ease the sample transfer through the sorbent. The syringe should be capable of drawing all sample, and subsequent wash reagent into the barrel. Watch as the liquid accumulates inside the syringe barrel and move the piston only as the accumulation slows down. Urine passes relatively fast through the sorbent bed, while serum and plasma pass much slower. If you run out of piston range, detach the sorbent tip, expel the solution from the syringe barrel, then reattach the sorbent tip and proceed with sample preparation.

Note: the sorbent tip should stay in the sample preparation vial through steps 3-8 (see figure 3) even while dispensing reagents. In case the sorbent tip cannot reach to the bottom of the vial tilt the vial to about 45°, push the tip into the vial gently, and proceed with the SPE step.

4. Pipette 200 μ L Reagent 2 (Washing Solution) into the same sample preparation vial. Pass the solution SLOWLY through the sorbent tip and into the syringe barrel. Drain the liquid from the sorbent bed by pulling air through the sorbent tip. Detach the sorbent tip, and leave it in the sample preparation vial, then discard the liquid accumulated in the syringe.

Note: save the syringe, as it can be reused with many other samples. For convenience place it into the pipette rack.

5. Pipette 200 μ L Eluting Medium (prepared fresh each day, section 3.2) into the same sample preparation vial.

KEEP THE SORBENT TIP IN THE VIAL - (FIGURE 3)

Keep the sorbent tip in the sample preparation vial through steps 3-8, even while dispensing reagents.

Figure 3



6. Pull back the piston of a 0.6 mL syringe halfway up the barrel and attach the sorbent tip used in steps 3-8.
7. Wet the sorbent with Eluting Medium; watch as the liquid rises through the sorbent particles and stop when the liquid reaches the filter plug in the sorbent tip.
8. Eject the liquid and sorbent particles out of the tip and into the sample preparation vial. Repeat step 7 and 8 until the sorbent particles in the tip are expelled into the sample preparation vial. Only the filter disk should remain in the empty tip, see figure 4. Keep the syringe as it can be reused with many other samples.
9. Using the adjustable Drummond Dialomatic Microdispenser (included) transfer 50 μ L Reagent 4 into the sample preparation vial.

Caution: Avoid cross-contamination by not touching the inner wall of the sample vial with the tip of the Microdispenser. The piston will ensure proper transfer of liquids into the vial without the need of touching the vial wall. Use the same Microdispenser with both Reagents 4 and 5. There is no need to change Microdispenser tips or to wash between uses. Change Microdispenser tips only when broken.

Warning: Do not use regular pipettes and tips with Reagents 4 and 5 as they will contaminate the sample! Use the included Microdispenser for Reagents 4 and 5 ONLY!

Note: for all subsequent sample preparation steps use a vortex mixer set in the touch (pulse) mode (to about 80% of max speed) for any mixing operations.

10. Emulsify the liquid in the vial by repeatedly vortexing for about 5-8 seconds. During vortexing hold the sample vial firmly between fingers, and keep it straight as you push it onto the vortex plate. Do not let vial wobble, otherwise liquid may come out of the vial. Allow reactions to proceed 1 minute or more. The emulsion will gradually separate into two layers.

Note: a longer reaction time than 1 minute at step 10 and at step 11, or later, at step 12, does not affect results.

11. Re-emulsify the liquids in the vial by vortexing again for about 5 seconds. Allow the reaction to proceed for one additional minute or more.
12. Transfer with the Microdispenser 100 μ L Reagent 5 (50 μ L twice, for convenience) and mix for about 5 seconds. Let the reaction proceed for one more minute.
13. Transfer part of the (upper) organic layer (about 50-100 μ L) using a Pasteur pipette into an autosampler vial (included). Avoid transferring aqueous layer along with the organic layer. Evaporate the solvent SLOWLY to almost dry under a gentle stream of nitrogen. Do not leave samples under the nitrogen stream for more than 10 minutes! Re-dissolve amino acid derivatives in 100 μ L (or less) of Reagent 6. Transfer the reconstituted sample into an insert (included) using a Pasteur pipette, and place the insert in the same autosampler vial. The reconstituted sample is ready for GC/MS analysis (see GC/MS set up and calibration in section 4).

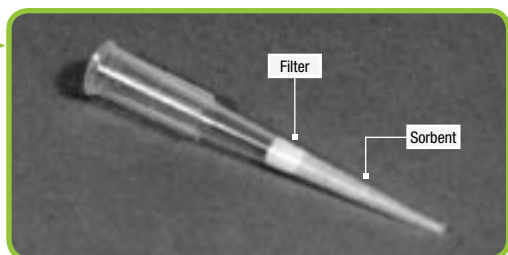
3.4 Optimizing Sample Preparation Time

For experienced users, sample preparation proceeds in 7-8 minutes per sample. This process can be further improved by preparing up to ten samples at a time. For example, at step 2 dispense Reagent 1 (and at later steps all other reagents) in ten vials successively, using the same pipette tip. At step 9, after dispensing Reagent 4, vortex 2-3 vials simultaneously. During each one minute wait at steps 10-12, prepare autosampler vials for sample transfer.

SORBENT TIP - (FIGURE 4)

Wet the sorbent with Eluting Medium and stop before it gets to the filter then eject the liquid and sorbent particles out of the tip.

Figure 4



4.0 GAS CHROMATOGRAPHIC ANALYSIS

4.1 Column For EZ:faast Physiological Amino Acid Analysis by GC-MS

The Zebtron ZB-AAA GC column comes without a cage. Connect the ends of the column in the usual manner; rest the column coil on the oven bracket. Keep the pieces of thermal thread spaced evenly around the column coil. The maximum column temperature is 320/340°C.

Caution: Always use safety glasses while installing the GC column.

4.2 Instrument Settings:

GC

Injection*	Split 1:15@250°C, 1.5-2µL (with hot needle, see section 4.5)
Carrier Gas	Helium 1.1mL/min constant flow
Oven program	30°C/min from 110° to 320°C

MS

MS Source	240°C
MS Quad	180°C
Auxiliary	310°C
Scan Range:	45-450 m/z
Sampling Rate	2 ² (3.5 scans/s)

*When using a Shimadzu GC instrument, please increase the injector temperature to 300°C



For your convenience we have included the GC/MS methods for Shimadzu QP-2010, Varian Saturn™ 2000 and Agilent 5973 GC/MS systems on the reference CD included with the kit. To use these included methods: copy the method folder into the appropriate method folder in your software and load.

4.3 Liners

Use the best deactivated liners supplied by the instrument manufacturer. Good results were obtained with FocusLiners™ (included; Phenomenex P/N AGO-4680; fits Agilent and Varian 1177 injectors). In general, the liner should carry a plug of silanized quartz or pesticide grade glass wool.

4.4 Injection

- Split injection at a ratio of 1:10 to 1:20 is recommended
- Injection volumes of 1.5-2µL are optimal

Quasi-splitless injection mode will produce a 5 to 10 fold increase in sensitivity with some instruments. In this mode, the split valve should be closed for an initial 5 to 7 seconds. Before selecting this injection mode it should be checked experimentally that no significant discrimination of late eluting amino acid derivatives takes place in comparison with common split injection. Alternatively, instruments equipped with EPC/AFC can be operated with double initial head pressure for 6-10 seconds.

4.5 Sampling

Both autosampler and manual sampling can be performed. If manual sampling is preferred, hot needle injection is recommended to prevent discrimination of components with high boiling temperatures. With this technique the sample plug is completely drawn into the syringe barrel, leaving the needle empty. The needle is inserted and kept in the hot injector for about two seconds before injection.

4.6 Calibration Standards

For quantitation purposes, mixtures of amino acid standards should be prepared following the Sample Preparation by SPE and Derivatization procedure described in this manual in Section 3.3. Standard mixtures should be stored in the freezer as some amino acids are not stable in solution. Three vials of different standard mixtures are included in the kit:

SD1: 23 amino acids, 200 nmoles/mL each, as follows:

AAA	ASP	GLY	LEU	PHE	THR
ABA	BAIB	HIS	LYS	PRO	TYR
aiLE	C-C	HYP	MET	SAR	VAL
ALA	GLU	ILE	ORN	SER	

SD2: Complementary amino acids not stable in acidic solution, 200 nmoles/mL each, as follows:

ASN	GLN	TRP
-----	-----	-----

SD3: Complementary urine amino acids, 200 nmoles/ mL each, as follows:

APA	CTH	GPR	HLY	PHP	TPR
-----	-----	-----	-----	-----	-----

A typical chromatogram of a mixture of all three amino acid standard solutions included in this kit. Column and instrumental settings as specified in section 4.1-4.2.

Figure 5

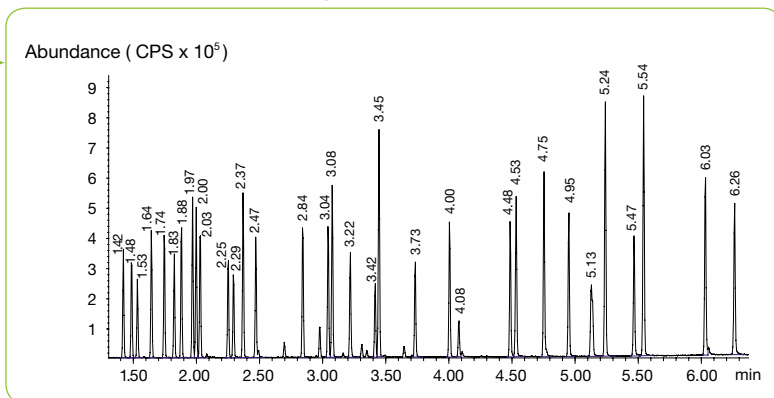


Figure 5. Elution order: tR 1.42min ALA; 1.48 SAR; 1.53 GLY; 1.64 ABA; 1.74 VAL; 1.83 BAIB; **1.88 IS = NVAL**; 1.97 LEU; 2.00 ALLE; 2.03 ILE; 2.25 THR; 2.29 SER; 2.37 PRO; 2.47 ASN; 2.84 TPR; 3.04 ASP; 3.08 MET; 3.22 HYP; 3.42 GLU; 3.45 PHE; 3.73 AAA; 4.00 APA; 4.08 GLN; 4.48 ORN; 4.53 GPR; 4.75 LYS; 4.95 HIS; 5.13 HLY; 5.24 TYR; 5.47 PHP; 5.54 TRP; 6.03 CTH and 6.26 C-C.

4.7 Calibration Procedure

Use the following standard amino acid mixtures and make duplicate injections of each to generate the desired calibration:

Calibration Solution

- I. 25 μ L of SD1 solution, plus 25 μ L of SD2 (and/or SD3 depending on your application), plus 100 μ L Reagent 1 (calibration level I:50 nmoles/mL)
- II. 50 μ L SD1 + 50 μ L SD2 (and/or SD3) + 100 μ L Reagent 1 (calibration level II:100 nmoles/mL)
- III. 100 μ L SD1 + 100 μ L SD2 (and/or SD3) + 100 μ L Reagent 1 (calibration level III:200 nmoles/mL).

The concentration of the internal standard (IS= Norvaline) in the sample prepared for gas-chromatographic analysis is 200 nmoles/mL (serum/urine/etc.).

Note: Disregard the first 3-5 injections when performing method calibration or after replacing column or liner. These injections act as primers and mask active sites inside the liner and chromatographic column. Use subsequent duplicate runs for calibration.

Remember: the SD1, SD2, and SD3 vials should be placed in the freezer after use! Allow standards to reach room temperature before use.

4.8 Calibration of analytical results

Calculations are performed by the Data Analysis portion of the software controlling the analytical instrument (gas-chromatograph). Calculations and calibration are based on an internal standard. Results are reported in the units entered for the internal standard and analyte levels in calibration mixtures.

Note: nmols/mL are equivalent to μ mols/L

5.0 TROUBLESHOOTING

Problem	Cause	Solution
Decrease in peak height for some amino acids (components of amino acid standard mixtures SD2 or SD3)	Possibly related to improper sample storage	See sample standard storage, section 6.0
Decrease in peak height for basic amino acids	Old eluting medium	Prepare eluting medium daily based on the number of samples to be analyzed on that day
Decrease in peak height or missing peaks for late eluting (HIS, C-C, HC-CH), or polar amino acids (SER, HYP, GLN)	Improper liner	Use deactivated liners, see section 4.4. Analyze samples only after making priming injections.
Decrease in peak height for early eluting amino acids	Sample too concentrated; the capacity of the SPE tip exceeded	Use less sample for preparation, see section 3.3, step 2. Constantly monitor the area for the IS peak.
Low peak height for late eluting derivatives	Volatile derivatives evaporated during removal of residual reagents with nitrogen gas	Adjust nitrogen flow to minimal; stop evaporation before sample gets completely dry
	Carrier gas leak	Check instrument for leaks (reinstall the column and check o-ring on liner)
Peak height for IS (Norvaline) lower compared to other early eluting amino acids in the standard mix	Pipetting error	Recalibrate pipette used for dispensing Reagent 1. Constantly monitor area for IS.
Ghost peaks	Pipette tips used for dispensing reagents or for transferring prepared samples may be a source of contaminant peaks	Use polypropylene pipette tips of appropriate quality (see ordering info on page 14). Always use the Microdispenser for dispensing Reagents 4, 5, and 6. Use Pasteur pipettes to transfer the reconstituted sample into a glass insert.
Early deterioration of column performance	Interfering peaks may result from extracted contaminants in plastic sample preparation vials	Use the vials provided in the kit. For autosampler vials order Phenomenex P/N AH0-4610 and for inserts AH0-4604.
	Residual sample preparation reagents degrade column stationary phase	Evaporate residual reagents at step 13. Do not use samples prepared as described in the EZ:faast kit for the analysis of free amino acids by GC-FID!
Interfering peaks, drug metabolites	Physiological sample anticoagulants, like citrate or citric acid may interfere in the amino acid profile	Samples collected with EDTA and heparin anticoagulants are recommended. Confirm peak identity based on mass- spectrum.

6.0 SAMPLE STORAGE AND STABILITY

Some amino acids are chemically unstable in physiological fluids (e.g., progressive decline of plasma glutamine and cystine in time), and also in standard mixtures. Keep samples and standard mixtures in the freezer. Old amino acid standard mixtures and mixtures which have not been stored properly should not be used for instrument calibration. Order fresh mixtures from Phenomenex (see ordering info in Phenomenex catalog).

Samples prepared for GC-MS analysis following the procedure outlined in this manual may be stored for several days in a freezer before analysis. For longer storage we recommend that samples be desiccated with anhydrous sodium sulfate, vials be capped and placed in the freezer. Since sample preparation is expeditious with this procedure we recommend analyzing samples prepared freshly. Samples prepared during the day may be left on the autosampler tray, at room temperature, to be analyzed during the night, or the next day.

7.0 CLEANING AND CARE OF SUPPLIES

The Drummond® Dialamatic Microdispenser should be flushed with isopropanol: acetone (approx. 1:1) at the end of the day. Please review the Drummond Microdispenser users manual for further care and use notes. The same organic mix is recommended as wash for both manual syringes and autosamplers.

Plastic syringes used for sample clean-up by SPE can be cleaned by flushing with propanol:water (1:2, v/v) mixture.

Always tightly cap the reagent bottles when not in use in order to avoid solvent evaporation and alteration of reagent composition. Cover the racks holding sorbent tips when not in use to prevent contamination.

8.0 QUALITY ASSURANCE

All components of the EZ:faast Gas Chromatographic Amino Acid Analysis kit are subjected to rigorous quality control testing. These measures help to ensure the best results. If poor results occur, please contact your Phenomenex technical consultant or distributor.

9.0 PRODUCT LIMITATIONS

Phenomenex Analyte Specific Reagent products are not intended for clinical use. Because they are not intended for clinical use, no claim or representation is made or intended for their clinical use (including, but not limited to diagnostic, prognostic, therapeutic or blood banking). It is the user's responsibility to validate the performance of Phenomenex products for any particular use, since the performance characteristics are not established. Phenomenex products may be used in clinical diagnostic laboratory systems after the laboratory has validated their complete system as required by the Clinical Laboratory Improvements Amendments of 1988 (CLIA '88) regulation in the U.S. or equivalent in other countries.

Trademarks

EZ:faast Sorbent Tips are patented, Phenomenex, Inc. U.S. Patent 6,770,246

EZ:faast is a trademark of Phenomenex, Inc.

Phenex is a trademark of Phenomenex, Inc.

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ordering information

EZ:faast™ Kit

Each kit includes: a ZB-AAA GC column (or EZ:faast AAA LC column), GC liners with GC kits, sample prep and derivatization reagents, sample prep vials, AA standard mixtures, SPE sorbent tips, vial rack, autosampler vials with inserts come with MS kits, Microdispenser for Reagents 4 and 5, and demo video.

Description	Order No.	Unit
GC-FID Free (Physiological) Amino Acid Analysis Kit	KGO-7165	ea
GC-MS Free (Physiological) Amino Acid Analysis Kit	KGO-7166	ea
GC-FID Protein Hydrolysate Kit	KGO-7167	ea
GC-MS Protein Hydrolysate Kit	KGO-7168	ea
LC/MS Free (Physiological) Amino Acid Analysis Kit with 250 x 2.0mm column	KHO-7337	ea
LC/MS Free (Physiological) Amino Acid Analysis Kit with 250 x 3.0mm column	KHO-7338	ea
LC/MS Protein Hydrolysate Kit with 250 x 2.0mm column	KHO-7339	ea
LC/MS Protein Hydrolysate Kit with 250 x 3.0mm column	KHO-7340	ea
GC Free (Physiological) Amino Acid Standards (SD1, SD2 & SD3) 2mL/vial x 2	AGO-7184	ea
GC Protein Hydrolysate Standard (SD) 2mL/vial x 2	AGO-7263	ea
LC/MS Free (Physiological) Amino Acid Standards for LC (SD1, SD2, & SD3) 2mL/vial x 2	ALO-7500	ea
LC/MS Protein Hydrolysate Standard (SD) 2mL/vial x 2	ALO-7501	ea

ordering information

Phenex™ Vials

This universal vial can be used in any autosampler that utilizes a 12 x 32mm vial. It may be used in place of crimp top and snap ring top vials. Eliminates the need of stocking many different style vials. The top screws down in 1/3 turn and eliminates the chore of crimping, de-crimping and snapping caps on. Cap comes with a bonded-in septa that eliminates septa slipping into vials. Vials and caps with bonded-in septa come in one convenient kit pack.

Description	Order No.	Unit
Clear wide mouth vial, cap and septa kit pack with:		
Rubber/PTFE septa	AHO-4610	1000/pk
Silicone/PTFE septa	AHO-4613	1000/pk
PTFE/Silicone/PTFE septa	AHO-4616	1000/pk
Amber wide mouth vial, cap and septa kit pack with:		
Rubber/PTFE septa	AHO-4619	1000/pk
Silicone/PTFE septa	AHO-4622	1000/pk
Clear wide mouth vial, cap with pre-slit septa:		
Silicone/PTFE septa	AHO-7507	1000/pk

SGE FocusLiners™

Description	GC Model No.	Dimensions ID x L x OD (mm)	Material* (deactivated)	Quartz Wool (Y/N)	Mfr P/N	Order No.	Unit
Thermo Electron (Carlo Erba) Single Taper/ Gooseneck Liner	8000 series	5 x 105 x 8.0	B (y)	Y	092046	AGO-4679	5/pk
Agilent Technologies Single Taper/ Gooseneck Liner	5880/5890 /6890	4 x 78.5 x 6.3	B (y)	Y	092003	AGO-4680	5/pk
PerkinElmer Single Taper/ Gooseneck Liner	Autosystem	4 x 92 x 6.2	B (y)	Y	092095	AGO-4681	5/pk
Shimadzu Single Taper/ Gooseneck Liner	17B	3.4 x 95 x 5	B (y)	Y	092068	AGO-4683	5/pk
Varian Single Taper/ Gooseneck Liner	1075/77	4 x 72 x 6.3	B (y)	Y	092025	AGO-4684	5/pk
Varian Double Taper/ Gooseneck Liner	1078/79	3.4 x 54 x 5	B (y)	Y	092036	AGO-4685	5/pk

* B=Borosilicate; Deactivated=Yes (y) or No (n)

EZ:faast - Free (Physiological) Amino Acid Analysis by GC-MS

QUICK REFERENCE GUIDE

Summary of Procedure:

1. For each sample line up one glass sample preparation vial in the vial rack.
2. Pipette 100µL sample (serum, plasma, urine or other; see section 3.3.2) and 100µL Reagent 1 into each sample preparation vial.
3. Attach a sorbent tip to a 1.5mL syringe; pass the solution in the sample preparation vial through the sorbent tip by **slowly** pulling back the syringe piston.
4. Pipette 200µL Reagent 2 (Washing Solution) into the sample preparation vial.
5. **Slowly** pass the solution through the sorbent tip and into the syringe barrel.
6. Detach the sorbent tip, and discard the liquid accumulated in the syringe.
7. Pipette 200µL Eluting Medium (prepared fresh each day, section 3.2) into the sample preparation vial.
8. Pull back the piston of a **0.6mL syringe** halfway up the barrel and attach the sorbent tip.
9. Wet the sorbent with Eluting Medium; stop when the liquid reaches the filter plug in the sorbent tip.
10. Eject the liquid and sorbent out of the tip and into the sample preparation vial. Repeat, until all sorbent particles in the tip are expelled into the sample preparation vial. Discard the empty tip.
11. Using the Drummond Dialamatic Microdispenser, transfer 50µL Reagent 4.
12. **Emulsify** by repeatedly vortexing the solution for about 5 seconds. Allow reaction to proceed for 1 minute or more.
13. Vortex the solution again for a few seconds to re-emulsify the content of the vial. Allow the reaction to proceed for at least one additional minute.
14. Using the Microdispenser, transfer 100µL Reagent 5, and re-emulsify by vortexing for about 5 seconds. Let the reaction proceed for 1 minute.
15. Transfer part of the (upper) organic layer (50-100µL) using a Pasteur pipette into an autosampler vial. Avoid transferring aqueous layer along with the organic layer. Evaporate the solvent **SLOWLY** to almost dry under a gentle stream of nitrogen (max 10 min). Re-dissolve amino acid derivatives in 100µL (or less) of Reagent 6 using a Pasteur pipette. Transfer the reconstituted sample into an insert, and place the insert in the same autosampler vial. The reconstituted sample is ready for GC/MS analysis.

Gas Chromatographic Analysis

GC Settings

Injection	Split 1:15 @ 250°C, 2.0µL
Carrier Gas	Helium, 1.1mL/min
Oven Program	30°C/min from 110° to 320°C

MS Settings

MS Source	240°C
MS Quad	180°C
Auxiliary	310°C
Scan Range	45-450 m/z
Sampling Rate	2 ² (3.5 scans/s)

ordering information

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www.phenomenex.com

Phenomenex products are available worldwide. For the distributor in your country, contact Phenomenex USA, International Department by telephone, fax or e-mail: International@phenomenex.com.

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