REFERENCE STANDARDS
FOODS, FLAVORS & FRAGRANCES MATERIALS

What's **NEW?** look for this circle

Flavors

Fruit Juice Organic Acid Standard (5 components)

citric acid	2,000µg/ml	quinic acid	2,000
fumaric acid	10*	tartaric acid	2,000
malic acid	2,000		

In water, 1mL/ampul
cat. # 35080 (ea.)

In water, 5mL/ampul
cat. # 35081 (ea.)

*Fumaric acid is a trace impurity in malic acid, as well as an added component of the mix. The amount of fumaric acid in malic acid will not affect the stated concentration of malic acid, but can represent a significant and variable deviation from the low concentration of fumaric acid stated to be in the mix. All other components of the mix are at the specified concentration.
Quantity discounts not available.

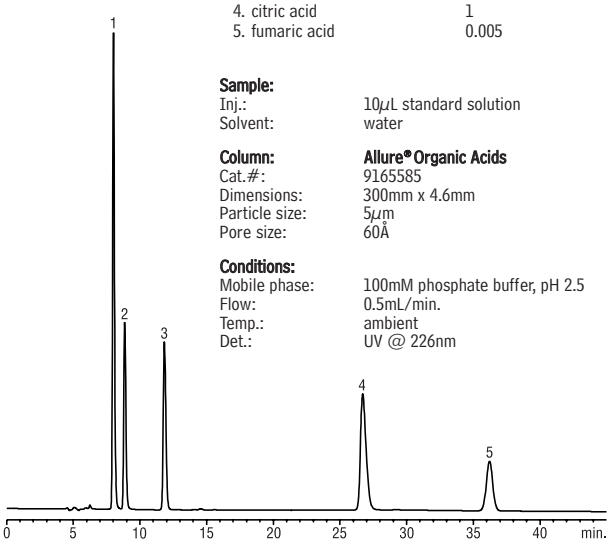
Organic acids on an Allure® Organic Acids HPLC column.

Peak List:	Conc. (mg/mL)
1. tartaric acid	1
2. quinic acid	1
3. malic acid	1
4. citric acid	1
5. fumaric acid	0.005

Sample:
Inj.: 10µL standard solution
Solvent: water

Column: **Allure® Organic Acids**
Cat.#: 9165585
Dimensions: 300mm x 4.6mm
Particle size: 5µm
Pore size: 60Å

Conditions:
Mobile phase: 100mM phosphate buffer, pH 2.5
Flow: 0.5mL/min.
Temp.: ambient
Det.: UV @ 226nm



LC_0238

Standard Methods for the Examination of Water and Wastewater Method 5560: Organic and Volatile Acids

The measurement of organic acids, either by adsorption and elution from a chromatographic column or by distillation, can be used as a control test for anaerobic digestion. The chromatographic separation method is presented for organic acids (5560B), while a method using distillation (5560C) is presented for volatile acids. A new method using gas chromatography is included for the determination of acetic, propionic, butyric, isobutyric, valeric, and isovaleric acids (5560D).

Free Fatty Acids Test Standard (6 components)

acetic acid	isovaleric acid
butyric acid (C4:0)	propionic acid
isobutyric acid	valeric acid

1,000µg/mL each in water, 1mL/ampul
cat. # 35272 (ea.)

Fragrances

Fragrance Materials Test Mix (12 components)

The Fragrance Materials Association (FMA) has proposed a method for analyzing essential oils on polar and nonpolar capillary GC columns. A performance evaluation mixture should be used to aid in detecting inlet problems, stationary phase degradation, loss of resolution, changes in sensitivity, and the presence of reactive sites in the sample pathway. Our test mix is consistent with the mixture proposed by the FMA. The required 5% test solution is made by diluting the 0.5mL of neat mixture to 10mL with acetone. The working solution will be stable for up to one week if transferred to a dark container and stored refrigerated.

benzoic acid	1.0%	geraniol	0.6%
benzyl salicylate	36.2%	hydroxycitronellal (3,7-dimethyl-7-hydroxyoctanal)	5.0%
1,8-cineole (eucalyptol)	0.5%	d-limonene	20.0%
trans cinnamaldehyde	0.5%	thymol	0.3%
cinnamyl acetate	0.3%	vanillin	0.1%
cinnamyl alcohol	0.3%		
ethyl butyrate	36.2%		

Neat, 0.5mL in an amber ampul
cat. # 31807 (ea.)

No data pack available.
Quantity discounts not available.

Fatty Acid Methyl Esters (FAMEs)

Marine Oil FAME Mix (20 components)

Chain	Description	% by Weight
C14:0	methyl myristate	6.0
C14:1	methyl myristoleate	1.0
C16:0	methyl palmitate	16.0
C16:1	methyl palmitoleate	5.0
C18:0	methyl stearate	8.0
C18:1	methyl oleate	13.0
C18:1	methyl vaccenate	4.0
C18:2	methyl linoleate	2.0
C18:3	methyl linolenate	2.0
C20:0	methyl arachidate	1.0
C20:1	methyl 11-eicosenoate	9.0
C20:2	methyl 11-14-eicosadienoate	1.0
C20:4	methyl arachidonate	3.0
C20:3	methyl 11-14-17-eicosatrienoate	1.0
C20:5	methyl eicosapentaenoate	10.0
C22:0	methyl behenate	1.0
C22:1	methyl erucate	3.0
C22:6	methyl docosahexaenoate	12.0
C24:0	methyl lingnocerate	1.0
C24:1	methyl nervonate	1.0

cat. # 35066 (100mg)

No data pack available.
Quantity discounts not available.

cis/trans FAME Mix (8 components)

Description	% by Weight
methyl elaidate (C18:1 *trans*-9)	10.0
methyl linoleate (C18:2 *cis*-9,12)	20.0
methyl oleate (C18:1 *cis*-9)	10.0
methyl petroselinate (C18:1*cis*-6)	8.0
methyl petroselaidate (C18:1*trans*-6)	8.0
methyl stearate (C18:0)	20.0
methyl transvaccenate (C18:1 *trans*-11)	12.0
methyl vaccenate (C18:1 *cis*-11)	12.0

10mg/mL total in methylene chloride, 1mL/ampul
cat. # 35079 (ea.)

No data pack available.
Quantity discounts not available.

Fatty Acid Methyl Esters (FAMEs) *cont'd*

NLEA FAME Mix (28 components)

Chain	% by Weight	Chain	% by Weight
C4:0	1.5	C18:1(*trans*-9)	2.5
C6:0	1.5	C18:1(*cis*-9)	15.0
C8:0	2.0	C18:2(all-*trans*-9,12)	2.5
C10:0	2.5	C18:2(all-*cis*-9,12)	10.0
C11:0	2.5	C18:3(all-*cis*-9,12,15)	5.0
C12:0	5.0	C20:0	2.5
C13:	2.5	C20:1(*cis*-11)	1.5
C14:0	2.5	C20:5(all-*cis*-5,8,11,14,17)	2.5
C14:1(*cis*-9)	1.5	C22:0	2.5
C15:0	1.5	C22:1(*cis*-13)	1.5
C16:0	10.0	C22:6(all-*cis*-4,7,10,13,16,19)	2.5
C16:1(*cis*-9)	5.0	C23:0	1.5
C17:0	2.5	C24:0	2.5
C18:0	5.0	C24:1(*cis*-15)	2.5

30mg/mL total in methylene chloride, 1mL/ampul
cat. # 35078 (ea.)

No data pack available.
Quantity discounts not available.

Food Industry FAME Mix (37 components)

Chain	% by Weight	Chain	% by Weight
C4:0	4.0	C18:2(all-*cis*-9,12)	2.0
C6:0	4.0	C18:3(all-*cis*-6,9,12)	2.0
C8:0	4.0	C18:3(all-*cis*-9,12,15)	2.0
C10:0	4.0	C20:0	4.0
C11:0	2.0	C20:1(*cis*-11)	2.0
C12:0	4.0	C20:2(all-*cis*-11,14,)	2.0
C13:	2.0	C20:3(all-*cis*-8,11,14)	2.0
C14:0	4.0	C20:3(all-*cis*-11,14,17)	2.0
C14:1(*cis*-9)	2.0	C20:4(all-*cis*-5,8,11,14)	2.0
C15:0	2.0	C20:5(all-*cis*-5,8,11,14,17)	2.0
C15:1(*cis*-10)	2.0	C21:0	2.0
C16:0	6.0	C22:0	4.0
C16;1(*cis*-9)	2.0	C22:1(*cis*-13)	2.0
C17:0	2.0	C22:2(all-*cis*-13,16)	2.0
C17:1(*cis*-10)	2.0	22:6 (all-*cis*-4,7,10,13,16,19)	2.0
C18:0	4.0	C23:0	2.0
C18:1(*trans*-9)	2.0	C24:0	4.0
C18:1(*cis*-9)	4.0	C24:1(*cis*-15)	2.0
C18:2(all-*trans*-9,12)	2.0		

30mg/mL total in methylene chloride, 1mL/ampul
cat. # 35077 (ea.)

No data pack available.
Quantity discounts not available.

Neat Fatty Acid Methyl Esters

Chain	Description	CAS #	qty.	cat.#	price
C6:0	methyl caproate	106-70-7	100mg	35037	$37
C7:0	methyl heptanoate	106-73-0	100mg	35038	$42
C8:0	methyl caprylate	111-11-5	100mg	35039	$37
C9:0	methyl nonanoate	1731-84-6	100mg	35040	$42
C10:0	methyl caprate	110-42-9	100mg	35041	$37
C11:0	methyl undecanoate	1731-86-8	100mg	35042	$42
C12:0	methyl laurate	111-82-0	100mg	35043	$37
C13:0	methyl tridecanoate	1731-88-0	100mg	35044	$47
C14:0	methyl myristate	124-10-7	100mg	35045	$37
C14:1 Δ 9 *cis*	methyl myristoleate	56219-06-8	100mg	35046	$120
C15:0	methyl pentadecanoate	7132-64-1	100mg	35047	$47
C16:0	methyl palmitate	112-39-0	100mg	35048	$37
C16:1 Δ 9 *cis*	methyl palmitoleate	1120-25-8	100mg	35049	$66
C17:0	methyl heptadecanoate	1731-92-6	100mg	35050	$47
C18:0	methyl stearate	112-61-8	100mg	35051	$37
C18:1 Δ 9 *cis*	methyl oleate	112-62-9	100mg	35052	$37
C18:2 Δ 9,12 *cis*	methyl linoleate	112-63-0	100mg	35053	$37
C18:3 Δ 9,12,15 *cis*	methyl linolenate	301-00-8	100mg	35054	$48
C19:0	methyl nonadecanoate	1731-94-8	100mg	35055	$48
C20:0	methyl arachidate	1120-28-1	100mg	35056	$42
C20:1 Δ 11 *cis*	methyl eicosenoate	2390-09-2	100mg	35057	$53
C20:2 Δ 11,14 *cis*	methyl eicosadienoate	2463-02-7	100mg	35058	$74
C20:3 Δ 11,14,17 *cis*	methyl eicosatrienoate	55682-88-7	100mg	35059	$80
C20:4 Δ 5,8,11,14 *cis*	methyl arachidonate	2566-89-4	100mg	35060	$84
C21:0	methyl heneicosanoate	6064-90-0	100mg	35061	$78
C22:0	methyl behenate	929-77-1	100mg	35062	$37
C22:1 Δ 13 *cis*	methyl erucate	1120-34-9	100mg	35063	$66
C24:0	methyl lignocerate	2442-49-1	100mg	35064	$78
C24:1 Δ 15 *cis*	methyl nervonate	2733-88-2	100mg	35065	$73

No data pack available.
Quantity discounts not available.

ordering **note**

Custom fatty acid methyl ester mixtures also are available. Call **800-356-1688** or **814-353-1300**, or contact your Restek representative for details.

Quantitative Fatty Acid Methyl Ester (FAME) Mixtures

These mixtures can be used for quantification (AOCS Method CE 1-62) and approximate the compositions of the following types of oils:

AOCS #1: corn, poppy seed, cotton seed, soybean, walnut, safflower, sunflower, rice, bran, and sesame oil
AOCS #2: linseed, perilla, hempseed, and rubberseed oil
AOCS #3: peanut, rapeseed, and mustard seed oil
AOCS #4: olive, teaseed, and neatsfoot oil
AOCS #5: coconut, palm kernel, babassu, and ouri-curi oil
AOCS #6: lard, beef or mutton tallow, and palm oil
FAME #1: oils of mid-range chain lengths (C16 - C18)
FAME #2: oils of short to mid-range chain lengths (C6 - C14)
FAME #3: oils of short to mid-range chain lengths (C8 - C16)
FAME #4: oils of mid-range to long chain lengths (C16 - C24)
FAME #5: oils of mid-range to long chain lengths (C16 - C24)
FAME #6: oils of long chain lengths (C20 - C21)
FAME #7: oils of short chain lengths (C6 - C10)
FAME #8: oils of short to mid-range chain lengths (C11 - C15)
FAME #9: oils of mid-range to long chain lengths (C16 - C20)
FAME #12: oils of mid-range to long chain lengths (C13 - C21)
FAME #13: mustard seed oil
FAME #14: cocoa butter
FAME #15: peanut oil

Mix	cat. #	price	Composition of each mixture listed as a weight/weight % basis (minimum 50mg/ampul)																												
			methyl caproate (6:0)	methyl heptanoate (7:0)	methyl caprylate (8:0)	methyl nonanoate (9:0)	methyl caprate (10:0)	methyl undecanoate (11:0)	methyl laurate (12:0)	methyl tridecanoate (13:0)	methyl myristate (14:0)	methyl pentadecanoate (15:0)	methyl palmitate (16:0)	methyl palmitoleate (16:1)	methyl heptadecanoate (17:0)	methyl stearate (18:0)	methyl oleate (18:1)	methyl linoleate (18:2)	methyl linolenate (18:3)	methyl nonadecanoate (19:0)	methyl arachidate (20:0)	methyl eicosenoate (20:1)	methyl eicosadienoate (20:2)	methyl homo γ linolenate (20:3)	methyl arachidonate (20:4)	methyl heneicosanoate (21:0)	methyl behenate (22:0)	methyl erucate (22:1)	methyl docosadienoate (22:2)	methyl lignocerate (24:0)	methyl nervonate (24:1)
AOCS #1	35022												6.0			3.0	35.0	50.0	3.0		3.0										
AOCS #2	35023												7.0			5.0	18.0	36.0	34.0												
AOCS #3	35024											1.0	4.0			3.0	45.0	15.0	3.0		3.0							3.0	20.0		3.0	
AOCS #4	35025												11.0			3.0	80.0	6.0													
AOCS #5	35026				7.0		5.0		48.0		15.0		7.0			3.0	12.0	3.0													
AOCS #6	35027										2.0		30.0	3.0		14.0	41.0	7.0	3.0												
FAME #1	35010												20.0			20.0	20.0	20.0	20.0												
FAME #2	35011		20.0		20.0		20.0		20.0		20.0																				
FAME #3	35012				20.0		20.0		20.0		20.0		20.0																		
FAME #4	35013												20.0			20.0					20.0							20.0		20.0	
FAME #5	35014													20.0			20.0					20.0							20.0		20.0
FAME #6	35015																				20.0	20.0	20.0	20.0	20.0						
FAME #7	35016		20.0	20.0	20.0	20.0	20.0																								
FAME #8	35017							20.0	20.0	20.0	20.0	20.0																			
FAME #9	35018												20.0		20.0	20.0				20.0	20.0										
FAME #12	35021									20.0		20.0			20.0					20.0						20.0					
FAME #13	35034												3.0	1.0		2.0	20.0	15.0	10.0		1.0	10.0	2.0				1.0	30.0	2.0	1.0	2.0
FAME #14	35035											0.1	26.3	0.4	0.3	33.7	34.3	3.1	0.2		1.3	0.1					0.2				
FAME #15	35036	$46											10.0			3.0	50.0	30.0			1.5	1.5					3.0			1.0	

Quantity discounts not available.

Composition of Fatty Acids by GC

EP 2.4.22 Composition of Fatty Acids by GC Mix 1

NEW!

(6 components)

Description	% by Weight	Description	% by Weight
methyl arachidate (C20:0)	40	methyl oleate (C18:1[cis9])	20
methyl dodecanoate (C12:0)	5	methyl palmitate (C16:0)	10
methyl myristate (C14:0)	5	methyl stearate (C18:0)	20

100mg total

cat. # 35100 (ea.)

No data pack available.
Quantity discounts not available.

EP 2.4.22 Composition of Fatty Acids by GC Mix 2

NEW!

(5 components)

Description	% by Weight	Description	% by Weight
methyl caproate (C6:0)	10	methyl dodecanoate (C12:0)	20
methyl caprylate (C8:0)	10	methyl myristate (C14:0)	40
methyl decanoate (C10:0)	20		

100mg total

cat. # 35101 (ea.)

No data pack available.
Quantity discounts not available.

QuEChERS Standards

- Ready to use for QuEChERS extractions—no dilutions necessary.
- Support for GC and HPLC with MS, MS/MS, and selective detectors.

NEW!

Pesticide analysis is fast and simple using QuEChERS methods. Use these cost-effective QuEChERS standards for even greater lab efficiency. Standards are compatible with all major methods, including mini-multiresidue, AOAC, and European procedures. Save time with convenient mixes or make your own blend using our full line of single component solutions.

QuEChERS Internal Standard Mix for GC/ECD Analysis

(4 components)

PCB 18
PCB 28
PCB 52
tris-(1,3-dichloroisopropyl)phosphate

50µg/mL each in acetonitrile, 5mL/ampul

cat. # 33265 (ea.)

QuEChERS Internal Standard Mix for GC/NPD and LC/MS/MS Analysis (2 components)

triphenyl phosphate	20µg/mL
tris-(1,3-dichloroisopropyl)phosphate	50µg/mL

In acetonitrile, 5mL/ampul

cat. # 33266 (ea.) $30

QuEChERS Internal Standard Mix for GC/MS Analysis

(6 components)

PCB 18	50µg/mL	tris-(1,3-dichloroisopropyl) phosphate	50
PCB 28	50	triphenylmethane	10
PCB 52	50		
triphenyl phosphate	20		

In acetonitrile, 5mL/ampul

cat. # 33267 (ea.)

QuEChERS Internal Standard Mix for LC/MS/MS Analysis

nicarbazin

10µg/mL in acetonitrile, 5mL/ampul

cat. # 33261 (ea.)

QuEChERS Quality Control Standards for GC/MS Analysis

Cat.# 33268:	Cat.# 33264:
PCB 138	anthracene
PCB 153	

50µg/mL each in acetonitrile, 5mL/ampul

cat. # 33268 (ea.)

100µg/mL in acetonitrile, 5mL/ampul

cat. # 33264 (ea.)

QuEChERS Single-Component Reference Standards

Concentration is µg/mL.

Compound	Solvent	Conc.	cat.# (ea.) price
PCB 18 (5mL)	ACN	50	33255
PCB 28 (5mL)	ACN	50	33256
PCB 52 (5mL)	ACN	50	33257
PCB 138 (5mL)	ACN	50	33262
PCB 153 (5mL)	ACN	50	33263
triphenylmethane (5mL)	ACN	10	33260
triphenylphosphate (5mL)	ACN	20	33258
tris(1,3-dichloroisopropyl)phosphate (5mL)	ACN	50	33259

ACN = acetonitrile

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Melamine Analysis Kit

kit NEW!

Kit includes:
Column:
Rxi-5Sil MS w/5 meter Integra-Guard
Standards:

33247: 1mL Melamine Stock Standard	(1,000µg/mL)
33248: 1mL Cyanuric Acid Stock Standard	(1,000µg/mL)
33249: 1mL Ammelide Stock Standard	(1,000µg/mL)
33250: 1mL Ammeline Stock Standard	(1,000µg/mL)
33251: 1mL Benzoguanamine Internal Standard	(1,000µg/mL)
33253: 1mL Melamine Mix Standard	(1,000µg/mL)

Derivatization Reagent:
35607: BSTFA w/1% TMCS, 25g vial
Accessories:
50mL centrifuge tubes, 5-pk.
13mm, 0.45µm nylon syringe filters, 5-pk.
Easy-to-follow instructions with procedural check lists to assist with laboratory documentation.

cat. # 33254 (kit)

Quantity discounts not available.

Melamine and Related Analogs Stock Standard (4 components)

ammelide, ammeline, cyanuric acid, melamine
1,000µg/mL each in diethylamine:water (20:80), 1mL/ampul
cat. # 33253 (ea.)

Melamine Stock Standard

melamine
1,000µg/mL in diethylamine:water (20:80), 1mL/ampul
cat. # 33247 (ea.)

Cyanuric Acid Stock Standard

cyanuric acid
1,000µg/mL in diethylamine:water (20:80), 1mL/ampul
cat. # 33248 (ea.)

Ammelide Stock Standard

ammelide
1,000µg/mL in diethylamine:water (20:80), 1mL/ampul
cat. # 33249 (ea.)

Ammeline Stock Standard

ammeline
1,000µg/mL in diethylamine:water (20:80), 1mL/ampul
cat. # 33250 (ea.)

Benzoguanamine Internal Standard

benzoguanamine
1,000µg/mL in pyridine, 1mL/ampul
cat. # 33251 (ea.)
1,000µg/mL in pyridine, 5mL/ampul
cat. # 33252 (ea.)

FAPAS® Food Testing Program*

Laboratories testing food quality and safety are encouraged to routinely perform proficiency tests. Proficiency testing is an external check of quality. It provides an independent and unbiased assessment of the performance of all aspects of the laboratory, both human and hardware. Each participating laboratory is encouraged to use its normal analytical method, thereby simulating the testing of a routine laboratory sample as closely as possible. While the outcome of the analysis may depend on the choice of method, it also could be affected by the performance of the laboratory equipment or the competence of the analyst. Using proficiency testing, those laboratories performing well can ensure high standards are maintained and those performing unsatisfactorily can implement corrective action rapidly. In an environment in which analytical laboratories compete intensively for work, proficiency testing provides the means by which external customers can compare competence in carrying out specific tests. Together with laboratory accreditation and the use of validated methods, proficiency tests are an important requirement of the EU Additional Measures Directive 93/99/EEC applying to laboratories entrusted with the official control of food.

FAPAS® Series 5 OC Pesticide Mix 1 (19 components)

Equal concentration of all compounds. Suitable for GC/MS analysis.

aldrin	dieldrin
α-BHC	α-endosulfan (I)
β-BHC	β-endosulfan (II)
γ-BHC (lindane)	endosulfan sulfate
α-chlordane (*cis*)	endrin
γ-chlordane (*trans*)	heptachlor
4,4'-DDD	heptachlor epoxide (isomer B)
4,4'-DDE	hexachlorobenzene
2,4'-DDT	oxychlordane
4,4'-DDT	

100μg/mL each in acetone, 1mL/ampul
cat. # 32412 (ea.)

FAPAS® Series 5 OC Pesticide Mix 2 (19 components)

Varied concentrations. Suitable for GC/ECD analysis.

aldrin	10μg/mL	dieldrin	20
α-BHC	10	α-endosulfan (I)	10
β-BHC	10	β-endosulfan (II)	20
γ-BHC (lindane)	10	endosulfan sulfate	20
α-chlordane (*cis*)	10	endrin	20
γ-chlordane (*trans*)	10	heptachlor	10
4,4'-DDD	20	heptachlor epoxide (isomer B)	10
4,4'-DDE	20	hexachlorobenzene	10
2,4'-DDT	20	oxychlordane	10
4,4'-DDT	20		

In acetone, 1mL/ampul
cat. # 32414 (ea.)

FAPAS® Series 9 OP Pesticide Mix 1 (10 components)

Equal concentration of all compounds. Suitable for GC/FPD, GC/NPD, & GC/MS analysis.

chlorpyriphos	fenitrothion
chlorpyriphos-methyl	malathion
diazinon	methacriphos
dichlorvos	phosphamidon
etrimphos	pirimiphos-methyl

100μg/mL each in acetone, 1mL/ampul
cat. # 32413 (ea.)

FAPAS-registered trademark of Central Science Laboratory, Sand Hutton, York, YO41, UK.

ASTM Method D6042-96 (Plastic Container Testing)

American Society for Testing and Materials (ASTM International) Method D6042-96—*Test Method for Determination of Phenolic Antioxidants and Erucamide Slip Additives in Polypropylene Homopolymer Formulations Using Liquid Chromatography*—is a "consensus" or "referee" method used among plastic manufacturers and the pharmaceutical companies that purchase plastic containers. Plastic container manufacturers use this test to ensure the quality of their product to their pharmaceutical customers. Pharmaceutical companies also specify this test and provide their own lists of target compounds and concentration limits in purchase agreements.

This test calls for isopropanol extraction, HPLC separation, and UV detection. Restek offers a variety of reversed phase HPLC columns suitable for these separations. Restek also designed an analytical reference material to validate this method. This mixture contains the common antioxidants and slips listed in ASTM D6042-96, along with BHT.

ASTM D6042-96 Calibration Mix (7 components)

BHT	Irganox 3114
erucamide slip	Irganox 1010
vitamin E	Irganox 1076
Irgafos 168	

50μg/mL each in isopropanol, 1mL/ampul
cat. # 31628 (ea.)

No data pack available.

ASTM D6042-96 Internal Standard Mix

Tinuvin P

51.8μg/mL in isopropanol, 1mL/ampul
cat. # 31629 (ea.)

No data pack available.

Other Additives Available From Restek on a Custom Basis

Similar methods for extractables in plastic pharmaceutical containers are cited in the United States Pharmacopeia (USP), British Pharmacopoeia (BP), European Pharmacopoeia (EP), and Japanese Pharmacopoeia (JP). Customers may also have formulation-specific or product-specific test mixtures. Please contact us for a custom mixture. Our current inventory of raw materials includes these popular antioxidants. We have many more not listed and can obtain most compounds you may need.

- Ethanox 323
- Ethanox 330
- Ethanox 702
- Ethanox 703
- Irganox L06
- Irganox L57
- Irganox L64
- Irganox L109
- Irganox L134
- Irganox L135
- Irganox 1035
- Santanox R
- Ultranox 626
- Vanlube 81
- Vanlube 848
- Vanlube 7723
- Vanlube AZ
- Vanlube NA
- Vanlube PCX
- Vanlube SL
- Vanlube SS

*Use of Restek calibration mixtures by laboratories participating in the FAPAS program is voluntary and no endorsement of any Restek product has been made by the Central Science Laboratory. To obtain further information regarding the FAPAS program, or to participate, contact fapas@csl.gov.uk.

Derivatization Reagents

- Reagents available for acylation, alkylation, and silylation.
- Packaged in 10 x 1 g vials or 25 g vials.
- High purity for accurate results.

Silylation Derivatization Reagents

- Replaces active hydrogen, reducing polarity and making the compounds more volatile.
- Increases stability of derivatives.

Silylation is the most widely used derivatization procedure for sample analysis by GC. In silylation, an active hydrogen is replaced by an alkylsilyl group such as trimethylsilyl (TMS) or *tert*-butyldimethylsilyl (*tert*-BDMS). Silyl derivatives are more volatile, less polar, and more thermally stable. As a result, GC separation is improved and detection is enhanced.

Both TMS and *tert*-BDMS reagents are suitable for a wide variety of compounds and can be used for many GC applications. Note that silylation reagents are generally moisture sensitive and must be sealed to prevent deactivation.

Compound	CAS#	cat.#	price
MSTFA (N-methyl-N-trimethylsilytrifluoroacetamide)			
10-pk. (10x1g)	24589-78-4	35600	
25g vial	24589-78-4	35601	
MSTFA w/1% TMCS (N-methyl-N-trimethylsilytrifluoroacetamide w/1% trimethylchlorosilane)			
10-pk. (10x1g)	24589-78-4	35602	
25g vial	24589-78-4	35603	
BSTFA (N,O-bis[trimethylsilyl]trifluoroacetamide)			
10-pk. (10x1g)	25561-30-2	35604	
25g vial	25561-30-2	35605	
BSTFA w/1% TMCS (N,O-bis[trimethylsilyltrifluoroacetamide] w/1% trimethylchlorosilane)			
10-pk. (10x1g)	25561-30-2	35606	
25g vial	25561-30-2	35607	
MTBSTFA w/1% TBDMCS (N-methyl-N[*tert*-butyldimethylsilyl trifluoroacetamide] w/1% *tert*-butyldimethylchlorosilane)			
10-pk. (10x1g)	77377-52-7	35608	
25g vial	77377-52-7	35610	
TMCS (trimethylchlorosilane)			
10-pk. (10x1g)	75-77-4	35611	
25g vial	75-77-4	35612	

Acylation Derivatization Reagents

- Most commonly used for electron capture detection.
- React with alcohols, amines and phenols.
- Frequently used for drugs of abuse confirmation.

Acylation reagents offer the same types of advantages available from silylation reagents: creating less polar, more volatile derivatives. In comparison to silylating reagents, the acylating reagents can more readily target highly polar multi-functional compounds, such as carbohydrates and amino acids. In addition, acylating reagents offer the distinct advantage of introducing electron-capturing groups, thus enhancing detectability during analysis.

Compound	CAS#	cat.#	price
MBTFA (N-methyl-bis-trifluoroacetamide)			
10-pk. (10x1g)	685-27-8	35616	
25g vial	685-27-8	35617	
TFAA (trifluoroacetic acid anhydride)			
10-pk. (10x1g)	407-25-0	35618	
25g vial	407-25-0	35619	
PFAA (pentafluoropropionic acid anhydride)			
10-pk. (10x1g)	356-42-3	35620	
25g vial	356-42-3	35621	
HFAA (heptafluorobutyric acid anhydride)			
10-pk. (10x1g)	336-59-4	35622	
25g vial	336-59-4	35623	
PFPOH (pentafluoropropanol)			
10-pk. (10x1g)	422-05-9	35624	
25g vial	422-05-9	35625	

Alkylation Derivatization Reagents

- Adds alkyl groups to functional hydrogens (H).
- Decreases polarity on compounds containing acidic hydrogens, i.e., phenols, carboxylic acids.
- Forms an ester.

Alkylation reagents reduce molecular polarity by replacing active hydrogens, such as carboxylic acids and phenols. Alkylation reagents can be used alone to form esters and amides or they can be used in conjunction with acylation or silylation reagents. A two-step approach is commonly used in the derivatization of amino acids, where multiple functional groups of these compounds may necessitate protection during derivatization.

Esterification is the reaction of an acid with an alcohol in the presence of a catalyst. It is the most popular method of alkylation due to the availability of reagents and ease of use. Alkyl esters are stable, and can be formed quickly and quantitatively. Retention of the derivative can be varied by altering the length of the substituted alkyl group. In addition to the formation of simple esters, alkylation reagents can be used in extraction procedures where biological matrices are present.

Compound	CAS#	cat.#	price
TMPAH			
10-pk. (10x1g)	1899-02-1	35614	
25g vial	1899-02-1	35615	