

Reference Standards

Foods, Flavors & Fragrances



Derivatization Reagents
Fatty Acid Methyl Esters (FAMES)
Fatty Acids
FAPAS®
Fragrance Allergens
Fragrances
Medical Cannabis
Melamine
MN Dept. of Agriculture Pesticides
Multiresidue Pesticides
Packaging
Phthalate Esters
Plastic Container Testing
Polycyclic Aromatic Hydrocarbons (PAHs)
QuEChERS



Derivatization Reagents

See pages 472–473.

Fatty Acid Methyl Esters (FAMES)

Marine Oil FAME Mix (20 components)

Chain	Description	% by Weight
C14:0	Methyl myristate (124-10-7)	6.0
C14:1	Methyl myristoleate (56219-06-8)	1.0
C16:0	Methyl palmitate (112-39-0)	16.0
C16:1	Methyl palmitoleate (1120-25-8)	5.0
C18:0	Methyl stearate (112-61-8)	8.0
C18:1	Methyl oleate (112-62-9)	13.0
C18:1	Methyl vaccenate (1937-63-9)	4.0
C18:2	Methyl linoleate (112-63-0)	2.0
C18:3	Methyl linolenate (301-00-8)	2.0
C20:0	Methyl arachidate (1120-28-1)	1.0
C20:1	Methyl 11-eicosenoate (2390-09-2)	9.0
C20:2	Methyl 11,14-eicosadienoate (2493-02-7)	1.0
C20:4	Methyl arachidonate (2566-89-4)	3.0
C20:3	Methyl 11,14,17-eicosatrienoate (55682-88-7)	1.0
C20:5	Methyl eicosapentaenoate (2734-47-6)	10.0
C22:0	Methyl behenate (929-77-1)	1.0
C22:1	Methyl erucate (1120-34-9)	3.0
C22:6	Methyl docosahexaenoate (301-01-9)	12.0
C24:0	Methyl lignocerate (2442-49-1)	1.0
C24:1	Methyl nervonate (2733-88-2)	1.0

cat.# 35066 (100 mg)

No data pack available.

cis/trans FAME Mix (8 components)

Description	% by Weight
methyl elaidate (C18:1 <i>trans</i> -9)	10.0
methyl linoleate (C18:2 <i>cis</i> -9,12)	20.0
methyl oleate (C18:1 <i>cis</i> -9)	10.0
methyl petroselinic acid (C18:1 <i>cis</i> -6)	8.0
methyl petroselinic acid (C18:1 <i>trans</i> -6)	8.0
methyl stearate (C18:0)	20.0
methyl transvaccenate (C18:1 <i>trans</i> -11)	12.0
methyl vaccenate (C18:1 <i>cis</i> -11)	12.0

10 mg/mL total in methylene chloride, 1 mL/ampul

cat.# 35079 (ea.)

No data pack available.

NLEA FAME Mix (28 components)

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

30 mg/mL total in methylene chloride, 1 mL/ampul

cat.# 35078 (ea.)

No data pack available.

Fatty Acid Methyl Esters (FAMES), *cont.*

Food Industry FAME Mix (37 components)

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

30 mg/mL total in methylene chloride, 1 mL/ampul

cat.# 35077 (ea.)

No data pack available.

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Fatty Acid Methyl Esters (FAMES), *cont.*

Neat Fatty Acid Methyl Esters

Use these materials to prepare specific mixtures not commercially available. These products are of the highest purity available, typically 99% by GC-FID analysis. Each compound is packaged under a nitrogen blanket to ensure product stability. A certificate of analysis is provided with each ampul.

Chain	Description	CAS #	qty.	cat.#
C6:0	Methyl caproate	106-70-7	100 mg	35037
C8:0	Methyl caprylate	111-11-5	100 mg	35039
C10:0	Methyl caprate	110-42-9	100 mg	35041
C11:0	Methyl undecanoate	1731-86-8	100 mg	35042
C12:0	Methyl laurate	111-82-0	100 mg	35043
C13:0	Methyl tridecanoate	1731-88-0	100 mg	35044
C14:0	Methyl myristate	124-10-7	100 mg	35045
C16:0	Methyl palmitate	112-39-0	100 mg	35048
C16:1 Δ 9 <i>cis</i>	Methyl palmitoleate	1120-25-8	100 mg	35049
C17:0	Methyl heptadecanoate	1731-92-6	100 mg	35050
C18:0	Methyl stearate	112-61-8	100 mg	35051
C18:1 Δ 9 <i>cis</i>	Methyl oleate	112-62-9	100 mg	35052
C18:2 Δ 9,12 <i>cis</i>	Methyl linoleate	112-63-0	100 mg	35053
C18:3 Δ 9,12,15 <i>cis</i>	Methyl linolenate	301-00-8	100 mg	35054
C19:0	Methyl nonadecanoate	1731-94-8	100 mg	35055
C20:0	Methyl arachidate	1120-28-1	100 mg	35056
C20:1 Δ 11 <i>cis</i>	Methyl eicosenoate	2390-09-2	100 mg	35057
C20:3 Δ 11,14,17 <i>cis</i>	Methyl eicosatrienoate	55682-88-7	100 mg	35059
C21:0	Methyl heneicosanoate	6064-90-0	100 mg	35061
C22:0	Methyl behenate	929-77-1	100 mg	35062
C22:1 Δ 13 <i>cis</i>	Methyl erucate	1120-34-9	100 mg	35063
C24:0	Methyl lignocerate	2442-49-1	100 mg	35064

No data pack available.

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 | FAME #1: | oils of mid-range chain lengths (C16–C18) |
| AOCS #2: | linseed, perilla, hempseed, and rubberseed oil | FAME #2: | oils of short- to mid-range chain lengths (C6–C14) |
| AOCS #3: | peanut, rapeseed, and mustard seed oil | FAME #3: | oils of short- to mid-range chain lengths (C8–C16) |
| AOCS #4: | olive, teaseed, and neatsfoot oil | FAME #4: | oils of mid-range to long chain lengths (C16–C24) |
| AOCS #5: | coconut, palm kernel, babassu, and ouricuri oil | FAME #5: | oils of mid-range to long chain lengths (C16–C24) |
| AOCS #6: | lard, beef or mutton tallow, and palm oil | FAME #6: | oils of long chain lengths (C20–C21) |
| | | FAME #13: | mustard seed oil |
| | | FAME #14: | cocoa butter |

Mix	cat.#	Composition of each mixture listed as a weight/weight % basis (minimum 50 mg/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 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 heno-γ-linolenate (20:3)	methyl arachidate (20:4)	methyl heneicosanoate (21:0)	methyl behenate (22:0)	methyl erucate (22:1)	methyl docosadecanoate (22:2)	methyl lignocerate (24:0)	methyl neovonate (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															
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
FAME #5	35014												20.0		20.0							20.0									20.0
FAME #6	35015																			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						

Composition of each compound listed as a weight/weight % basis.

Fatty Acids

EP 2.4.22 Composition of Fatty Acids by GC Mix 1

(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

100 mg total

cat.# 35100 (ea.)

No data pack available.

EP 2.4.22 Composition of Fatty Acids by GC Mix 2

(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		

100 mg total

cat.# 35101 (ea.)

No data pack available.

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 (64-19-7)	Isovaleric acid (503-74-2)
Butyric acid (C4:0) (107-92-6)	Propionic acid (79-09-4)
Isobutyric acid (79-31-2)	Valeric acid (109-52-4)

1,000 µg/mL each in water, 1 mL/ampul

cat.# 35272 (ea.)

Food Analysis Performance Assessment Scheme (FAPAS®)

FAPAS® Food Testing Program*

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

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

Aldrin (309-00-2)	Dieldrin (60-57-1)
α-BHC (319-84-6)	α-Endosulfan (I) (959-98-8)
β-BHC (319-85-7)	β-Endosulfan (II) (33213-65-9)
γ-BHC (Lindane) (58-89-9)	Endosulfan sulfate (1031-07-8)
cis-Chlordane (5103-71-9)	Endrin (72-20-8)
trans-Chlordane (5103-74-2)	Heptachlor (76-44-8)
4,4'-DDD (72-54-8)	Heptachlor epoxide (isomer B) (1024-57-3)
4,4'-DDE (72-55-9)	Hexachlorobenzene (118-74-1)
2,4'-DDT (789-02-6)	Oxychlordane (27304-13-8)
4,4'-DDT (50-29-3)	

100 µg/mL each in acetone, 1 mL/ampul

cat.# 32412 (ea.)

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

Varied concentrations. Suitable for GC-ECD analysis.

Aldrin (309-00-2)	10 µg/mL	Dieldrin (60-57-1)	20
α-BHC (319-84-6)	10	α-Endosulfan (I) (959-98-8)	10
β-BHC (319-85-7)	10	β-Endosulfan (II) (33213-65-9)	20
γ-BHC (Lindane) (58-89-9)	10	Endosulfan sulfate (1031-07-8)	20
cis-Chlordane (5103-71-9)	10	Endrin (72-20-8)	20
trans-Chlordane (5103-74-2)	10	Heptachlor (76-44-8)	10
4,4'-DDD (72-54-8)	20	Heptachlor epoxide (isomer B) (1024-57-3)	10
4,4'-DDE (72-55-9)	20	Hexachlorobenzene (118-74-1)	10
2,4'-DDT (789-02-6)	20	Oxychlordane (27304-13-8)	10
4,4'-DDT (50-29-3)	20		

In acetone, 1 mL/ampul

cat.# 32414 (ea.)

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

Equal concentration of all compounds. Suitable for GC-FPD, GC-NPD, and GC-MS analysis.

Chlorpyrifos (2921-88-2)	Fenitrothion (122-14-5)
Chlorpyrifos-methyl (5598-13-0)	Malathion (121-75-5)
Diazinon (333-41-5)	Methacryphos (62610-77-9)
Dichlorvos (DDVP) (62-73-7)	Phosphamidon (13171-21-6)
Etrifophos (38260-54-7)	Pirimiphos-methyl (29232-93-7)

100 µg/mL each in acetone, 1 mL/ampul

cat.# 32413 (ea.)

*Use of Restek® calibration mixtures by laboratories participating in the FAPAS® program is voluntary; 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



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Fragrance Allergens

Fragrance Allergen Standards Kit

- Highly stable formulation has a minimum shelf life of 18 months.
- Fully resolves 31 fragrance allergens with one analysis on an Rxi®-17 column.
- Ideal for GC-MS analysis following IFRA methodology.
- Helps you meet EU requirements defined in the European Cosmetics Directive.
- All components included at 400 ppm to allow dilution for calibration curves and use with different solvents.
- Exceeds purity requirements outlined in IFRA method.

MTBE Solvent Blank

methyl *tert*-butyl ether (MTBE) (1634-04-4) Neat

1-Fluoronaphthalene (Internal Standard)

1-fluoronaphthalene (321-38-0) 20 µg/mL

Fragrance Allergen Standard A (Includes Internal Standard)

α-amylcinnamaldehyde*† (122-40-7) 400 µg/mL
 cinnamal* (104-55-2) 400
 citral*† (5392-40-5) 400
 3,7-dimethyl-7-hydroxyoctanal* (107-75-5) 400
 1-fluoronaphthalene (321-38-0) 20
 α-hexylcinnamaldehyde*† (101-86-0) 400
 linal* (80-54-6) 400
 lylal*† (31906-04-4) 400
 phenylacetaldehyde** (122-78-1) 400

Fragrance Allergen Standard B (Includes Internal Standard)

α-amylcinnamic alcohol*† (101-85-9) 400 µg/mL
 benzyl alcohol* (100-51-6) 400
 cinnamyl alcohol* (104-54-1) 400
 citronellol* (106-22-9) 400
 eugenol* (97-53-0) 400
 farnesol*† (4602-84-0) 400
 1-fluoronaphthalene (321-38-0) 20
 geraniol* (106-24-1) 400
 isoeugenol* (97-54-1) 400
 linalool* (78-70-6) 400
 4-methoxybenzyl alcohol* (105-13-5) 400
 methyl eugenol** (93-15-2) 400

Fragrance Allergen Standard C (Includes Internal Standard)

4-allylanisole** (140-67-0) 400 µg/mL
 benzyl benzoate* (120-51-4) 400
 benzyl cinnamate* (103-41-3) 400
 benzyl salicylate* (118-58-1) 400
 camphor** (76-22-2) 400
 1,8-cineole** (470-82-6) 400
 coumarin* (91-64-5) 400
 1-fluoronaphthalene (321-38-0) 20
 limonene* (138-86-3) 400
iso-α-methylionone* (127-51-5) 400
 methyl 2-nonyanoate** (111-80-8) 400
 methyl 2-octynoate* (111-12-6) 400
 safrole** (94-59-7) 400

*Compound listed in 7th Amendment to the European Cosmetics Directive.

**Additional potential allergens included in this formulation.

†Compounds defined as two isomers resulting in two chromatographic peaks.

Contains 1 mL each of these mixtures (in methyl *tert*-butyl ether).

cat.# 33105 (kit)

kit

Fragrances

Fragrance Materials Test Mix (12 components)

- Performance evaluation for essential oils and fragrance chemicals.
- System suitability mixture for GC systems and analytical columns.
- Convenient 0.5 mL quantity for easy dilution to recommended working solution.

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 0.5 mL of neat mixture to 10 mL with acetone. The working solution will be stable for up to one week if transferred to a dark container and stored refrigerated.

Benzoic acid (65-85-0)	1.0%	Geraniol (106-24-1)	0.6%
Benzyl salicylate (118-58-1)	36.2%	Hydroxycitronellal (3,7-Dimethyl-7-hydroxyoctanal) (107-75-5)	5.0%
1,8-Cineole (Eucalyptol) (470-82-6)	0.5%	<i>trans</i> -Cinnamaldehyde (14371-10-9)	20.0%
<i>trans</i> -Cinnamaldehyde (14371-10-9)	0.5%	d-Limonene (5989-27-5)	0.3%
Cinnamyl acetate (103-54-8)	0.3%	Thymol (89-83-8)	0.3%
Cinnamyl alcohol (104-54-1)	0.3%	Vanillin (121-33-5)	0.1%
Ethyl butyrate (105-54-4)	36.2%		

Neat, 0.5 mL in an amber ampul

cat.# 31807 (ea.)

No data pack available.

Medical Cannabis

Cannabinoids Standard (3 components)

Cannabidiol (13956-29-1)
 Cannabinol (521-35-7)
 delta-9-Tetrahydrocannabinol (Δ⁹-THC) (1972-08-3)

1,000 µg/mL each in P&T methanol, 1 mL/ampul

cat.# 34014 (ea.)

Medical Marijuana Singles

Concentration is µg/mL. Volume is 1 mL/ampul.

Compound	CAS #	Solvent	Conc.	cat.#
Cannabichromene (CBC)	20675-51-8	PTM	1,000	34092
Cannabidiol (CBD)	13956-29-1	PTM	1,000	34011
Cannabidiolic Acid (CBDA)	1244-58-2	ACN	1,000	34094
Cannabigerol (CBG)	25654-31-3	PTM	1,000	34091
Cannabinol (CBN)	521-35-7	PTM	1,000	34010
delta-8-Tetrahydrocannabinol (Δ ⁸ -THC)	5957-75-5	PTM	1,000	34090
delta-9-Tetrahydrocannabinol (Δ ⁹ -THC)	1972-08-3	M	1,000	34067
delta-9-Tetrahydrocannabinolic acid A (Δ ⁹ -THCA-A)	23978-85-0	PTM	1,000	34093
Tetrahydrofuran-d8	1693-74-9	PTM	2,000	30112
(±)11-nor-9-carboxy-Δ ⁹ -THC	104874-50-2	M	100	34068

ACN = acetonitrile; M = methanol; PTM = purge-and-trap grade methanol

Melamine

Melamine Analysis Kit

Kit includes:

Column:

Rxi-5Sil MS w/5-meter Integra-Guard

Standards:

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

Derivatization Reagent:

35607: BSTFA w/1% TMCS, 25 g vial

Accessories:

50 mL empty centrifuge tubes, 10-pk.

13 mm, 0.45 µm nylon syringe filters, 20-pk.

Easy-to-follow instructions with procedural checklists to assist with laboratory documentation.

Contains contents listed above.

cat.# 33254 (kit)

kit

*Kit contains a 10-pk. of tubes and 20-pk. of filters. 50-pk. of tubes (cat.# 26239) and 100-pk. of filters (cat.# 26147) sold separately.

Melamine and Related Analogs Stock Standard

(4 components)

Ammelide (645-93-2)	Cyanuric Acid (108-80-5)
Ammeline (645-92-1)	Melamine (108-78-1)

1,000 µg/mL each in diethylamine:water (20:80), 1 mL/ampul

cat.# 33253 (ea.)

Melamine Stock Standard

Melamine (108-78-1)

1,000 µg/mL in diethylamine:water (20:80), 1 mL/ampul

cat.# 33247 (ea.)

Cyanuric Acid Stock Standard

Cyanuric acid (108-80-5)

1,000 µg/mL in diethylamine:water (20:80), 1 mL/ampul

cat.# 33248 (ea.)

Ammelide Stock Standard

Ammelide (645-93-2)

1,000 µg/mL in diethylamine:water (20:80), 1 mL/ampul

cat.# 33249 (ea.)

Ammeline Stock Standard

Ammeline (645-92-1)

1,000 µg/mL in diethylamine:water (20:80), 1 mL/ampul

cat.# 33250 (ea.)

Benzoguanamine Internal Standard

Benzoguanamine (91-76-9)

1,000 µg/mL in pyridine, 1 mL/ampul

cat.# 33251 (ea.)

MN Dept. of Agriculture Pesticides

Minnesota Ag List 1 Pesticides Mix A (16 components)

Acetochlor (34256-82-1)	Metolachlor (51218-45-2)
Alachlor (15972-60-8)	Metribuzin (21087-64-9)
Atrazine (1912-24-9)	Pendimethalin (40487-42-1)
Cyanazine (Bladex) (21725-46-2)	Prometon (1610-18-0)
Desethylatrazine (6190-65-4)	Propachlor (1918-16-7)
Desisopropylatrazine (1007-28-9)	Propazine (139-40-2)
Dimethenamid (87674-68-8)*	Simazine (122-34-9)
Ethalfuralin (55283-68-6)	Trifluralin (1582-09-8)

200 ppm each in acetone, 1 mL/ampul

cat.# 32406 (ea.)

*Added to Minnesota Department of Agriculture List 1 pesticide (neutrals) incident investigation requirements, effective January 1, 2000.¹ CAS # 87674-68-8 manufactured by several companies under various trade names.

¹Analytical Lists for Pesticide Incident Investigations, Minnesota Department of Agriculture, Guidance Document 26 (3/99), St. Paul, MN. For a copy, visit their website at: www.mda.state.mn.us

Minnesota Ag List 1 Pesticides Mix B (6 components)

Chlorpyrifos (2921-88-2)	Phorate (298-02-2)
EPTC (759-94-4)	Terbufos (13071-79-9)
Fonofos (944-22-9)	Triallate (2303-17-5)

200 ppm each in acetone, 1 mL/ampul

cat.# 32407 (ea.)

Minnesota Ag List 1 Pesticide Kit

Contains 1 mL each of these mixtures.

32406: Minnesota Ag List Pesticides Mix A

32407: Minnesota Ag List Pesticides Mix B

Contains 1 mL each of these mixtures.

cat.# 32408 (kit)

kit

also available

Rxi®-5Sil MS Column

Ideal for pesticide and melamine analysis.

See **page 32**.



Growing Analytical Solutions for Medical Cannabis Labs

Products and expertise for accurate, reliable results every time

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Multiresidue Pesticides

GC Multiresidue Pesticide Kit

- Accurately identify and quantify pesticide residues by GC-MS/MS in fruits, vegetables, botanicals, and herbals like tea, ginseng, ginger, Echinacea, and dietary supplements.
- Comprehensive 203-compound kit covers food safety lists by the FDA, USDA, and other global governmental agencies; individual ampuls also sold separately.
- Formulated and grouped for maximum long-term stability* and well-balanced chromatographic performance, even for early eluting compounds.
- Quantitatively tested to confirm composition; detailed support documentation provided.
- Optimized multiresidue pesticide method is offered free of charge; downloadable XLS file includes conditions and transition tables.
- Certified reference material (CRM) manufactured and QC-tested in Restek's ISO-accredited labs satisfies your ISO requirements.
- Restek is your complete supplier for world-class GC-MS/MS multiresidue pesticide analysis: reference and internal standards, Rxi®-5ms GC columns, Q-sep® QuEChERS sample prep, Sky® inlet liners, accessories, and more!



Cat. # 32563: GC Multiresidue Pesticide Standard #1 (16 components)

Organophosphorus Compounds
 Azinphos ethyl (2642-71-9)
 Azinphos methyl (86-50-0)
 Chlorpyrifos (2921-88-2)
 Chlorpyrifos methyl (5598-13-0)
 Diazinon (333-41-5)
 EPN (2104-64-5)
 Fenitrothion (122-14-5)
 Isazophos (42509-80-8)
 Phosalone (2310-17-0)
 Phosmet (732-11-6)
 Pirimiphos ethyl (23505-41-1)
 Pirimiphos methyl (29232-93-7)
 Pyraclofos (77458-01-6)
 Pyrazophos (13457-18-6)
 Pyridaphenthion (119-12-0)
 Quinalphos (13593-03-8)

Cat. # 32564: GC Multiresidue Pesticide Standard #2 (40 components)

Organochlorine Compounds
 Aldrin (309-00-2)
 alpha-BHC (319-84-6)
 beta-BHC (319-85-7)
 delta-BHC (319-86-8)
 gamma-BHC (Lindane) (58-89-9)
 Chlorbenside (103-17-3)
 cis-Chlordane (5103-71-9)
 trans-Chlordane (5103-74-2)
 Chlorfenson (Ovex) (80-33-1)
 Chloroneb (2675-77-6)
 2,4'-DDD (53-19-0)
 4,4'-DDD (72-54-8)
 2,4'-DDE (3424-82-6)
 4,4'-DDE (72-55-9)
 2,4'-DDT (789-02-6)
 4,4'-DDT (50-29-3)
 4,4'-Dichlorobenzophenone (90-98-2)
 Dieldrin (60-57-1)
 Endosulfan I (959-98-8)
 Endosulfan II (33213-65-9)
 Endosulfan ether (3369-52-6)
 Endosulfan sulfate (1031-07-8)
 Endrin (72-20-8)
 Endrin aldehyde (7421-93-4)
 Endrin ketone (53494-70-5)
 Ethylan (Perthane) (72-56-0)
 Fenson (80-38-6)

Cat. # 32565: GC Multiresidue Pesticide Standard #3 (25 components)

Organonitrogen Compounds
 Benfluralin (1861-40-1)
 Biphenyl (92-52-4)
 Chlorothalonil (1897-45-6)
 Dichlofluanid (1085-98-9)
 Dichloran (99-30-9)
 3,4-Dichloroaniline (95-76-1)
 2,6-Dichlorobenzonitrile (Dichlobenil) (1194-65-6)
 Diphenylamine (122-39-4)
 Ethalfluralin (55283-68-6)
 Fluchloralin (33245-39-5)
 Isopropanil (33820-53-0)
 Nitralin (4726-14-1)
 Nitrofen (1836-75-5)
 Oxyfluorfen (42874-03-3)
 Pendimethalin (40487-42-1)
 Pentachloroaniline (527-20-8)
 Pentachlorobenzonitrile (20925-85-3)
 Pentachloronitrobenzene (Quintozene) (82-68-8)
 Prodiamine (29091-21-2)
 Profluralin (26399-36-0)
 2,3,5,6-Tetrachloroaniline (3481-20-7)
 Tetrachloronitrobenzene (Tecnazene) (117-18-0)
 THPI (Tetrahydrophthalimide) (1469-48-3)
 Tolyfluanid (731-27-1)
 Trifluralin (1582-09-8)

Cat. # 32566: GC Multiresidue Pesticide Standard #4 (28 components)

Organonitrogen Compounds
 Acetochlor (34256-82-1)
 Atachlor (15972-60-8)
 Allidochlor (93-71-0)
 Clomazone (Command) (81777-89-1)
 Cycloate (1134-23-2)
 Diallylate (cis & trans) (2303-16-4)
 Dimethachlor (50563-36-5)
 Diphenamid (957-51-7)
 Fenpropathrin (39515-41-8)
 Fluquinconazole (136426-54-5)
 Flutolanil (66332-96-5)
 Linuron (330-55-2)
 Metazachlor (67129-08-2)
 Methoxychlor (72-43-5)
 Metolachlor (51218-45-2)
 N-(2,4-Dimethylphenyl)formamide (60397-77-5)
 Norflurazon (27314-13-2)
 Oxadiazon (19666-30-9)
 Pebulate (1114-71-2)
 Pretlachlor (51218-49-6)
 Prochloraz (67747-09-5)
 Propachlor (1918-16-7)
 Propanil (709-98-8)
 Propisochlor (86763-47-5)
 Propyzamide (23950-58-5)
 Pyridaben (96489-71-3)
 Tebufenpyrad (119168-77-3)
 Triallate (2303-17-5)

Cat. # 32567: GC Multiresidue Pesticide Standard #5 (34 components)

Organonitrogen Compounds
 Atrazine (1912-24-9)
 Bupirimate (41483-43-6)
 Captafol (2425-06-1)
 Captan (133-06-2)
 Chlorfenapyr (122453-73-0)
 Cyprodinil (121552-61-2)
 Etofenprox (80844-07-1)
 Etridiazole (2593-15-9)
 Fenarimol (60168-88-9)
 Fipronil (120068-37-3)
 Fludioxonil (131341-86-1)
 Fluridone (Sonar) (59756-60-4)
 Flusilazole (85509-19-9)
 Flutriafol (76674-21-0)

Folpet (133-07-3)
 Hexazinone (Velpar) (51235-04-2)
 Iprodione (36734-19-7)
 Lenacil (2164-08-1)
 MGK-264 (113-48-4)
 Myclobutanil (88671-89-0)
 Paclobutrazol (76738-62-0)
 Penconazole (66246-88-6)
 Procyimidone (32809-16-8)
 Propargite (2312-35-8)
 Pyrimethanil (53112-28-0)
 Pyriproxyfen (95737-68-1)
 Tebuconazole (107534-96-3)
 Terbacil (5902-51-2)
 Terbutylazine (5915-41-3)
 Triadimefon (43121-43-3)
 Triadimenol (55219-65-3)
 Tricyclazole (Beam) (41814-78-2)
 Triflumizole (68694-11-1)
 Vinclozolin (50471-44-8)

Cat. # 32568: GC Multiresidue Pesticide Standard #6 (18 components)

Synthetic Pyrethroid Compounds
 Acrinathrin (101007-06-1)
 Anthraquinone (84-65-1)
 Bifenthrin (82657-04-3)
 Bioallethrin (584-79-2)
 Cyfluthrin (68359-37-5)
 lambda-Cyhalothrin (91465-08-6)
 Cypermethrin (52315-07-8)
 Deltamethrin (52918-63-5)
 Fenvalerate (51630-58-1)
 Flucythrinate (70124-77-5)
 tau-Fluvalinate (102851-06-9)
 cis-Permethrin (61949-76-6)
 trans-Permethrin (61949-77-7)
 Phenothrin (cis & trans) (26002-80-2)
 Resmethrin (10453-86-8)
 Tefluthrin (79538-32-2)
 Tetramethrin (7696-12-0)
 Transfluthrin (118712-89-3)

Cat. # 32569: GC Multiresidue Pesticide Standard #7 (10 components)

Herbicide Methyl Esters
 Acequinoxil (57960-19-7)
 Bromopropylate (18181-80-1)
 Carfentrazone ethyl (128639-02-1)
 Chlorobenzilate (510-15-6)

Chlorpropham (101-21-3)
 Chlozolinate (84332-86-5)
 DCPA methyl ester (Chlorthal-dimethyl) (1861-32-1)
 Fluazifop-p-butyl (79241-46-6)
 Metalaxyl (57837-19-1)
 2-Phenylphenol (90-43-7)

Cat. # 32570: GC Multiresidue Pesticide Standard #8 (24 components)

Organophosphorus Compounds
 Bromfeninfos-methyl (13104-21-7)
 Bromfeninfos (33399-00-7)
 Bromophos ethyl (4824-78-6)
 Bromophos methyl (2104-96-3)
 Carbophenothion (786-19-6)
 Chlorfeninfos (470-90-6)
 Chlorthiophos (60238-56-4)
 Coumaphos (56-72-4)
 Edifenphos (17109-49-8)
 Ethion (563-12-2)
 Fenamiphos (22224-92-6)
 Fenchlorphos (Ronnel) (299-84-3)
 Iodofen (55-38-9)
 Iodofenfos (18181-70-9)
 Leptophos (21609-90-5)
 Malathion (121-75-5)
 Methacrifos (62610-77-9)
 Profenofos (41198-08-7)
 Prothiofos (34643-46-4)
 Sulphotepp (3689-24-5)
 Sulprofos (35400-43-2)
 Tebufos (13071-79-9)
 Tetraclorvinfos (22248-79-9)
 Tolclofos-methyl (57018-04-9)

Cat. # 32571: GC Multiresidue Pesticide Standard #9 (8 components)

Organophosphorus Compounds
 Disulfoton (298-04-4)
 Fonofos (944-22-9)
 Methyl parathion (298-00-0)
 Mevinphos (7786-34-7)
 Parathion (Ethyl parathion) (56-38-2)
 Phorate (298-02-2)
 Piperonyl butoxide (51-03-6)
 Triazophos (24017-47-8)

Contains 1 mL each of these mixtures.

cat.# 32562 (kit)

kit

* NOTE: When combining a large number of compounds with different chemical functionalities, mix stability can be an issue. In formulating these standards, we extensively studied the 203 compounds involved, then grouped them into as few mixes as possible while still ensuring maximum long-term stability and reliability. For quantitative analysis, we recommend analyzing each mix separately to ensure accurate results for every compound.

Multiresidue Pesticides, *cont.*

GC Multiresidue Pesticide Standard #1 (16 components)

Organophosphorus Compounds

100 µg/mL each in toluene, 1 mL/ampul

cat.# 32563 (ea.)

NEW!

GC Multiresidue Pesticide Standard #2 (40 components)

Organochlorine Compounds

100 µg/mL each in toluene, 1 mL/ampul

cat.# 32564 (ea.)

NEW!

GC Multiresidue Pesticide Standard #3 (25 components)

Organonitrogen Compounds

100 µg/mL each in toluene:acetonitrile (99:1), 1 mL/ampul

cat.# 32565 (ea.)

NEW!

GC Multiresidue Pesticide Standard #4 (28 components)

Organonitrogen Compounds

100 µg/mL each in toluene, 1 mL/ampul

cat.# 32566 (ea.)

NEW!

GC Multiresidue Pesticide Standard #5 (34 components)

Organonitrogen Compounds

100 µg/mL each in toluene, 1 mL/ampul

cat.# 32567 (ea.)

NEW!

GC Multiresidue Pesticide Standard #6 (18 components)

Synthetic Pyrethroid Compounds

100 µg/mL each in toluene, 1 mL/ampul

cat.# 32568 (ea.)

NEW!

GC Multiresidue Pesticide Standard #7 (10 components)

Herbicide Methyl Esters

100 µg/mL each in toluene, 1 mL/ampul

cat.# 32569 (ea.)

NEW!

GC Multiresidue Pesticide Standard #8 (24 components)

Organophosphorus Compounds

100 µg/mL each in toluene, 1 mL/ampul

cat.# 32570 (ea.)

NEW!

GC Multiresidue Pesticide Standard #9 (8 components)

Organophosphorus Compounds

100 µg/mL each in toluene, 1 mL/ampul

cat.# 32571 (ea.)

NEW!

Labeled Pesticide Residue Internal Standards for Food Analysis

- Isotopically labeled to provide the best approach for pesticide residue quantification.
- Multiple options let you choose internal and surrogate standards that will mitigate matrix effects.
- Economically priced and compatible with both LC-MS and GC-MS applications; even helpful for optimizing LC-MS/MS system performance.
- Certified reference material (CRM) manufactured and QC-tested in Restek's ISO-accredited labs—satisfy your ISO requirements.
- Restek is your complete supplier for world-class food safety analysis: pesticide reference standard mixes and internal/surrogate standards, GC and LC columns, QuEChERS, and more!

Compound	CAS #	Solvent	Conc.	cat.#
Atrazine-d5	163165-75-1	ACN	100	31984
Carbaryl-d7	362049-56-7	ACN	100	31985
Diazinon-d10 (diethyl-d10)	100155-47-3	ACN	100	31986
Dichlorvos-d6	203645-53-8	A	100	31987
Dimethoate-d6	1219794-81-6	ACN	100	31988
Diuron-d6	1007536-67-5	ACN	100	31989
Linuron-d6	330-55-2	ACN	100	31990

A = acetone; ACN = acetonitrile

Volume is 1 mL/ampul. Concentration is µg/mL.

Quantity Discounts Available

- Buy 3 Standards, Get 10% Off
- Buy 5 Standards, Get 20% Off

Not available for all standards. Contact your local Restek® representative for more details.



also available: LC Multiresidue Pesticide Kit | See page 570.



Multiresidue Pesticides, cont.

LC Multiresidue Pesticide Kit

- Accurately detect and quantify pesticides of global food safety concern in a wide range of fruits, vegetables, and other commodities by LC-MS/MS.
- Full kit contains 204 compounds of interest, covering many LC-determined pesticides listed by government agencies; individual ampuls also sold separately.
- Formulated and grouped for maximum long-term stability* and well-balanced chromatographic performance, even for early eluting compounds.
- Quantitatively tested to confirm composition; detailed support documentation provided.
- Optimized multiresidue pesticide method is offered free of charge; downloadable XLS file includes conditions and transition tables.
- Certified reference material (CRM) manufactured and QC-tested in Restek's ISO-accredited labs satisfies your ISO requirements.
- Restek is your complete supplier for world-class LC-MS/MS multiresidue pesticide analysis: reference and internal standards, Ultra and Pinnacle® DB LC columns, Q-sep® QuEChERS sample prep products, accessories, and more!



Cat. # 31972: LC Multiresidue Pesticide Standard #1 (13 components)

Organophosphorus Compounds
 Acephate (30560-19-1)
 Carbaryl (Sevin) (63-25-2)
 Dicrotophos (141-66-2)
 Dimethoate (60-51-5)
 Dimethomorph (110488-70-5)
 Isocarbophos (24353-61-5)
 Methamidophos (10265-92-6)
 Mevinphos (7786-34-7)
 Monocrotophos (6923-22-4)
 Omethoate (1113-02-6)
 Temephos (Abate) (3383-96-8)
 Trichlorfon (Dylox) (52-68-6)
 Vamidothion (Vamidoate) (2275-23-2)

Cat. # 31973: LC Multiresidue Pesticide Standard #2 (16 components)

Carbamate/Uron Compounds
 Alanycarb (83130-01-2)
 Aldicarb (116-06-3)
 Aldicarb sulfone (1646-88-4)
 Aldicarb sulfoxide (1646-87-3)
 Benfuracarb (82560-54-1)
 Butocarboxim (34681-10-2)
 Butoxycarboxim (34681-23-7)
 Ethiofencarb (29973-13-5)
 Furathiocarb (65907-30-4)
 Methabenzthiazuron (18691-97-9)
 Methiocarb (2032-65-7)
 Methomyl (16752-77-5)
 Oxamyl (23135-22-0)
 Tebuthiuron (34014-18-1)
 Thidiazuron (51707-55-2)
 Thiophanate-methyl (23564-05-8)

Cat. # 31974: LC Multiresidue Pesticide Standard #3 (38 components)

Carbamate/Uron Compounds
 Bendiocarb (22781-23-3)
 Bifenazate (149877-41-8)
 Carbofuran (1563-66-2)
 Chlorfluzazuron (71422-67-8)
 Chloroxuron (1982-47-4)
 Chlortoluron (15545-48-9)
 Cycluron (2163-69-1)

Diethofencarb (87130-20-9)
 Diflubenzuron (35367-38-5)
 Dioxacarb (6988-21-2)
 Diuron (330-54-1)
 Fenobucarb (BPMC) (3766-81-2)
 Fenoxycarb (79127-80-3)
 Fenuron (101-42-8)
 Flufenoxuron (101463-69-8)
 Fluometuron (2164-17-2)
 Forchlorfenuron (68157-60-8)
 Hexaflumuron (86479-06-3)
 3-Hydroxycarbofuran (16655-82-6)
 Indoxacarb (173584-44-6)
 Iprovalicarb (140923-17-7)
 Isoprocab (2631-40-5)
 Isoproturon (34123-59-6)
 Linuron (330-55-2)
 Lufenuron (103055-07-8)
 Metobromuron (3060-89-7)
 Monolinuron (1746-81-2)
 Neburon (555-37-3)
 Novaluron (116714-46-6)
 Pirimicarb (23103-98-2)
 Promecarb (2631-37-0)
 Propam (122-42-9)
 Propoxur (Baygon) (114-26-1)
 Pyraclostrobin (175013-18-0)
 Siduron (1982-49-6)
 Teflubenzuron (83121-18-0)
 Thiobencarb (28249-77-6)
 Triflumuron (64628-44-0)

Cat. # 31975: LC Multiresidue Pesticide Standard #4 (63 components)

Organonitrogen Compounds
 Abamectin (17151-41-2)
 Acetamiprid (135410-20-7)
 Ametryn (834-12-8)
 Amitraz (33089-61-1)
 Azoxystrobin (131860-33-8)
 Benalaxyl (71626-11-4)
 Benzoximate (29104-30-1)
 Boscalid (188425-85-6)
 Butafenacil (134605-64-4)
 Carbetamide (16118-49-3)
 Carfentrazone-ethyl (128639-02-1)
 Chlorantraniliprole (500008-45-7)
 Clofentezine (74115-24-5)
 Cymoxanil (57966-95-7)
 Cyprodinil (121552-61-2)

Cyromazine (66215-27-8)
 Dimoxystrobin (149961-52-4)
 Dinotefuran (165252-70-0)
 Doramectin (117704-25-3)
 Eprinomectin (123997-26-2)
 Famoxadon (131807-57-3)
 Fenazaquin (120928-09-8)
 Fenhexamid (126833-17-8)
 Fenpyroximate (111812-58-9)
 Fonicamid (158062-67-0)
 Fluzinam** (79622-59-6)
 Fludioxonil (131341-86-1)
 Fluoxastrobin (361377-29-9)
 Flutolanil (66332-96-5)
 Furalaxyl (57646-30-7)
 Halofenozide (112226-61-6)
 Imazalil (35554-44-0)
 Imidacloprid (138261-41-3)
 Ivermectin (70288-86-7)
 Kresoxim-methyl (143390-89-0)
 Mandipropamid (374726-62-2)
 Mepanipyrim (110235-47-7)
 Novaluron (116714-46-6)
 Metaflumizone (139968-49-3)
 Metalaxyl (57837-19-1)
 Methoxyfenozide (161050-58-4)
 Moxidectin (113507-06-5)
 Myclobutanil (88671-89-0)
 Nitenpyram (120738-89-8)
 Oxadixyl (77732-09-3)
 Picoxystrobin (117428-22-5)
 Piperonyl butoxide (51-03-6)
 Prochloraz (67747-09-5)
 Prometon (1610-18-0)
 Pymetrozine (123312-89-0)
 Pyracarbolid (24691-76-7)
 Pyrimethanil (53112-28-0)
 Pyriproxyfen (95737-68-1)
 Quinoxifen (124495-18-7)
 Rotenone (83-79-4)
 Secbumeton (26259-45-0)
 Spiroxamine (118134-30-8)
 Tebufenozide (112410-23-8)
 Tebufenpyrad (119168-77-3)
 Terbumeton (33693-04-8)
 Triadimefon (43121-43-3)
 Trifloxystrobin (141517-21-7)
 Zoxamide (156052-68-5)

Cat. # 31976: LC Multiresidue Pesticide Standard #5 (30 components)

Organonitrogen Compounds

Acibenzolar-5-methyl (135158-54-2)
 Bupirimate (41483-43-6)
 Buprofezin (69327-76-0)
 Carboxin (5234-68-4)
 Clethodim (99129-21-2)
 Clothianidin (210880-92-5)
 Cyazofamid (120116-88-3)
 Ethiprole (181587-01-9)
 Ethofumesate (26225-79-6)
 Fenamidone (161326-34-7)
 Fipronil (120068-37-3)
 Flubendimide (272451-65-7)
 Flufenacet (Fluthiamide) (142459-58-3)
 Hexythiazox (78587-05-0)
 Mefenacet (73250-68-7)
 Mesotrione (104206-82-8)
 Methoprotryne (841-06-5)
 Metribuzin (21087-64-9)
 Prometryne (7287-19-6)
 Propargite (2312-35-8)
 Prothioconazole (178928-70-6)
 Pyridaben (96489-71-3)
 Simetryn (1014-70-6)
 Sulfentrazone (122836-35-5)
 Terbutryn (886-50-0)
 Thiabendazole (148-79-8)
 Thiacloprid (111988-49-9)
 Thiamethoxam (153719-23-4)
 Thiofanox (39196-18-4)
 Tricyclazole (Beam) (41814-78-2)

Cat. # 31977: LC Multiresidue Pesticide Standard #6 (28 components)

Organonitrogen Compounds
 Baycor (Biteranol) (55179-31-2)
 Bromuconazole (116255-48-2)
 Cyproconazole (113096-99-4)
 Diclobutrazol (75736-33-3)
 Difenconazole (119446-68-3)
 Diniconazole (83657-24-3)
 Epoxiconazole (135319-73-2)
 Etaconazole (60207-93-4)
 Ethirimol (23947-60-6)
 Etoxazole (153233-91-1)
 Fenarimol (60168-88-9)
 Fenbuconazole (114369-43-6)
 Fluquinconazole (136426-54-5)
 Flusilazole (85509-19-9)
 Flutriafol (76674-21-0)
 Fuberidazole (3878-19-1)

Hexaconazole (79983-71-4)
 Ipconazole (125225-28-7)
 Metconazole (125116-23-6)
 Nuarimol (63284-71-9)
 Paclobutrazol (76738-62-0)
 Penconazole (66246-88-6)
 Propiconazole (Tilt) (60207-90-1)
 Tebuconazole (107534-96-3)
 Tetraconazole (112281-77-3)
 Triadimenol (55219-65-3)
 Triflumizole (68694-11-1)
 Triticonazole (131983-72-7)

Cat. # 31978: LC Multiresidue Pesticide Standard #7 (7 components)

Organonitrogen Compounds
 Emamectin-benzoate (155569-91-8)
 Fenpropimorph (67564-91-4)
 Spirodiclofen (148477-71-8)
 Spinosad (168316-95-8)
 Spirotetramat (203313-25-1)
 Spinetoram (J&L) (187166-40-1)
 Spiromesifen (283594-90-1)

Cat. # 31979: LC Multiresidue Pesticide Standard #8 (7 components)

Organonitrogen Compounds
 Hydramethylnon (67485-29-4)

Cat. # 31980: LC Multiresidue Pesticide Standard #9 (7 components)

Carbamate/Uron Compounds
 Aminocarb (2032-59-9)
 Desmedipham (13684-56-5)
 Formetanate HCL (23422-53-9)
 Mexacarbate (Zectran) (315-18-4)
 Monceren (Pencycuron) (66063-05-6)
 Phenmedipham (13684-63-4)
 Propamocarb free base (24579-73-5)

Cat. # 31981: LC Multiresidue Pesticide Standard #10 (7 components)

Carbamate/Uron Compounds
 Carbendazim (10605-21-7)

Contains 1 mL each of these mixtures.

cat. # 31971 (kit)

kit

* NOTE: When combining a large number of compounds with different chemical functionalities, mix stability can be an issue. In formulating these standards, we extensively studied the 204 compounds involved, then grouped them into a few mixes as possible while still ensuring maximum long-term stability and reliability. For quantitative analysis, we recommend analyzing each mix separately to ensure accurate results for every compound.

** NOTE: In this standard, fluzinam should only be used for qualitative analysis. A single-component standard (cat. # 31982) is available for quantitative analysis.

Multiresidue Pesticides, cont.**LC Multiresidue Pesticide Standard #1** (13 components)

Organophosphorus Compounds

100 µg/mL each in acetonitrile, 1 mL/ampul

cat.# 31972 (ea.)

NEW!

LC Multiresidue Pesticide Standard #7 (7 components)

Organonitrogen Compounds

100 µg/mL each in acetonitrile, 1 mL/ampul

cat.# 31978 (ea.)

NEW!

LC Multiresidue Pesticide Standard #2 (16 components)

Carbamate/Uron Compounds

100 µg/mL each in acetonitrile, 1 mL/ampul

cat.# 31973 (ea.)

NEW!

LC Multiresidue Pesticide Standard #8 (hydramethylInon)

Organonitrogen Compounds

100 µg/mL each in acetonitrile, 1 mL/ampul

cat.# 31979 (ea.)

NEW!

LC Multiresidue Pesticide Standard #3 (38 components)

Carbamate/Uron Compounds

100 µg/mL each in acetonitrile, 1 mL/ampul

cat.# 31974 (ea.)

NEW!

LC Multiresidue Pesticide Standard #9 (7 components)

Carbamate/Uron Compounds

100 µg/mL each in acetonitrile, 1 mL/ampul

cat.# 31980 (ea.)

NEW!

LC Multiresidue Pesticide Standard #4 (63 components)

Organonitrogen Compounds

100 µg/mL each in acetonitrile, 1 mL/ampul

cat.# 31975 (ea.)

NEW!

LC Multiresidue Pesticide Standard #10 (carbendazim)

Carbamate/Uron Compounds

100 µg/mL each in methanol, 1 mL/ampul

cat.# 31981 (ea.)

NEW!

LC Multiresidue Pesticide Standard #5 (30 components)

Organonitrogen Compounds

100 µg/mL each in acetonitrile, 1 mL/ampul

cat.# 31976 (ea.)

NEW!

Fluazinam Standard

Fluazinam (79622-59-6)

100 µg/mL in acetonitrile, 1 mL/ampul

cat.# 31982 (ea.)

NEW!

LC Multiresidue Pesticide Standard #6 (28 components)

Organonitrogen Compounds

100 µg/mL each in acetonitrile, 1 mL/ampul

cat.# 31977 (ea.)

NEW!

Searching Online for Reference Standards?



Find a Specific Compound

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www.restek.com/reference

Find Specific Documentation

Locate SDSs, certificates, & data packs by cat. # or lot # with our **Reference Standards Documentation Search**.
www.restek.com/documentation
also available: GC Multiresidue Pesticide Kit | See **page 568**.

Packaging

MOSH/MOAH Standard (9 components)

- Developed specifically for using LC coupled with GC-FID to accurately determine hydrocarbons found in mineral oils, which can migrate from packaging into food.
- This 9-component mix contains non-interfering internal standards as well as both mineral oil saturated hydrocarbon (MOSH) and mineral oil aromatic hydrocarbon (MOAH) markers to correctly cut fractions.
- Certified reference material (CRM) manufactured and QC-tested in Restek's ISO-accredited labs satisfies your ISO requirements.
- Restek is your complete supplier for world-class MOSH/MOAH analysis: reference standards, Allure® silica LC columns, Rxi®-5Sil MS GC columns, accessories, and more!

Bicyclohexyl (92-51-3)	300 µg/mL
Cholestane (5-alpha-cholestane) (481-21-0)	600
1-Methylnaphthalene (90-12-0)	300
2-Methylnaphthalene (91-57-6)	300
<i>n</i> -Pentylbenzene (538-68-1)	300
Perylene (198-55-0)	600
1,3,5-Tri- <i>tert</i> -butylbenzene (1460-02-2)	300
<i>n</i> -Tridecane (C13) (629-50-5)	150
<i>n</i> -Undecane (C11) (1120-21-4)	300

150-600 µg/mL each in toluene, 1 mL/ampul

cat.# 31070 (ea.)



Phthalate Esters

See page 530.

Plastic Container Testing

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 for 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, LC separation, and UV detection. Restek offers a variety of reversed-phase LC columns suitable for these separations. Restek also designed a reference standard 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 (128-37-0)	Irganox 3114 (27676-62-6)
Erucamide slip (112-84-5)	Irganox 1010 (6683-19-8)
Vitamin E (59-02-9)	Irganox 1076 (2082-79-3)
Irgafos 168 (31570-04-4)	

50 µg/mL each in isopropanol, 1 mL/ampul

cat.# 31628 (ea.)

Polycyclic Aromatic Hydrocarbons (PAHs)

EFSA PAH4 Standard (4 components)

- European Food Safety Authority (EFSA) PAH4 compounds prepared in toluene solvent.
- High 1,000 µg/mL concentration—dilute as needed to economically prepare custom mixes.
- Low volatility—longer shelf life and more accurate results.
- High miscibility—compatible with QuEChERS solvents.
- Certified reference material (CRM) meets strict ISO quality requirements.
- Pair with Rxi®-PAH GC column for easy separation of EFSA PAH4 compounds from common interferences in food and environmental samples. See page 84 for more details.

Benz[a]anthracene (56-55-3)	Benzo[b]fluoranthene (205-99-2)
Benzo[a]pyrene (50-32-8)	Chrysene (218-01-9)

1,000 µg/mL each in toluene, 1 mL/ampul

cat.# 32469 (ea.)



See pages 511–513 for additional PAH standards.

Restek® Safe Cracker

Included with every reference standard shipment for added convenience.

QuEChERS

QuEChERS Performance Standards

- Designed for use in all QuEChERS methods for pesticides in fruits and vegetables, including the original unbuffered method, AOAC 2007.01, and EN15662.
- Ideal for initial method evaluations and ongoing method performance validations.
- Precise formulation improves data quality and operational efficiency; spend more time running samples and less time sourcing and preparing standards.
- Quantitatively analyzed to confirm the composition and stability of each mixture.
- Produced and tested in accordance with ISO Guide 34 and 17025 accreditation.

QuEChERS Performance Standards Kit

- Kit contains organochlorine, organonitrogen, organophosphorus, and carbamate pesticides commonly used on fruits and vegetables.
- Volatile, polar, active, base-sensitive, and nonvolatile compounds are included to allow comprehensive evaluation of QuEChERS extraction and cleanup efficiencies, and optimization of GC and LC instrumental conditions.
- Analytes are divided into three ampuls based on compatibility for maximum stability and shelf life.*

Contains 1 mL each of these mixtures.
 31153: QuEChERS Performance Standard A
 31154: QuEChERS Performance Standard B
 31155: QuEChERS Performance Standard C

300 µg/mL each in acetonitrile/acetic acid (99.9:0.1), 1 mL/ampul.
 Blend equal volumes of all three ampuls for a 100 µg/mL final solution.
 cat.# 31152 (kit)



*When combining compounds with different functionalities, chemical stability can be an issue. The analytes in this kit are separated into three mixes to ensure maximum long-term storage stability. For analysis, a fresh working standard should be prepared by combining the three kit mixes in a 1:1:1 ratio to prepare a 100 µg/mL working standard solution. Once blended, Restek does not recommend storing working standards or subsequent dilutions for future use.

Restek Offers a Full Line of Certified Reference Materials

See pages 464–465.



www.restek.com/iso

QuEChERS Performance Standard A (16 components)

Acephate (30560-19-1)	Fenthion (55-38-9)
Azinphos methyl (86-50-0)	Malathion (121-75-5)
Chlorpyrifos (2921-88-2)	Methamidophos (10265-92-6)
Coumaphos (56-72-4)	Mevinphos (7786-34-7)
Diazinon (333-41-5)	Omethoate (1113-02-6)
Dichlofluanid (1085-98-9)	Phosalone (2310-17-0)
Dichlorvos (DDVP) (62-73-7)	Pirimiphos methyl (29232-93-7)
Dimethoate (60-51-5)	Propargite (2312-35-8)

300 µg/mL each in acetonitrile:acetic acid (99.9:0.1), 1 mL/ampul
 cat.# 31153 (ea.)



QuEChERS Performance Standard B (7 components)

gamma-BHC (Lindane) (58-89-9)	Endosulfan sulfate (1031-07-8)
Chlorothalonil (1897-45-6)	Endrin (72-20-8)
4,4'-DDT (50-29-3)	2-Phenylphenol (90-43-7)
Dicofol (Kelthane) (115-32-2)	

300 µg/mL each in acetonitrile:acetic acid (99.9:0.1), 1 mL/ampul
 cat.# 31154 (ea.)



QuEChERS Performance Standard C (17 components)

Bifenthrin (82657-04-3)	Iprodione (36734-19-7)
Captan (133-06-2)	Metalaxyl (57837-19-1)
Carbaryl (sevin) (63-25-2)	Methiocarb (2032-65-7)
Cyprodinil (121552-61-2)	Myclobutanil (88671-89-0)
Deltamethrin (52918-63-5)	cis-Permethrin (61949-76-6)
Fenhexamid (126833-17-8)	trans-Permethrin (61949-77-7)
Fenpropathrin (39515-41-8)	Thiabendazole (148-79-8)
Folpet (133-07-3)	Vinclozolin (50471-44-8)
Imazalil (35554-44-0)	

300 µg/mL each in acetonitrile:acetic acid (99.9:0.1), 1 mL/ampul
 cat.# 31155 (ea.)



QuEChERS, *cont.*

QuEChERS Standards

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

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 (37680-65-2) Tris-(1,3-dichloroisopropyl)phosphate
 PCB 28 (7012-37-5) (13674-87-8)
 PCB 52 (35693-99-3)
 50 µg/mL each in acetonitrile, 5 mL/ampul
 cat.# 33265 (ea.)

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

Triphenylphosphate (115-86-6) 20 µg/mL
 Tris-(1,3-dichloroisopropyl)phosphate (13674-87-8) 50 µg/mL
 In acetonitrile, 5 mL/ampul
 cat.# 33266 (ea.)

QuEChERS Internal Standard Mix for GC-MS Analysis
(6 components)

PCB 18 (37680-65-2) 50 µg/mL Triphenylphosphate (115-86-6) 20
 PCB 28 (7012-37-5) 50 Tris-(1,3-dichloroisopropyl)phosphate
 PCB 52 (35693-99-3) 50 (13674-87-8) 50
 Triphenylmethane (519-73-3) 10
 In acetonitrile, 5 mL/ampul
 cat.# 33267 (ea.)

**QuEChERS Internal Standard Mix
for LC-MS/MS Analysis**

Nicarbazin (bis-nitrophenyl urea) (330-95-0)
 10 µg/mL in acetonitrile, 5 mL/ampul
 cat.# 33261 (ea.)



**QuEChERS Quality Control Standards
for GC-MS Analysis**

Cat. # 33268: PCB 138 (35065-28-2) PCB 153 (35065-27-1)
Cat. # 33264: Anthracene (120-12-7)
 50 µg/mL each in acetonitrile, 5 mL/ampul
 cat.# 33268 (ea.)
 100 µg/mL in acetonitrile, 5 mL/ampul
 cat.# 33264 (ea.)

QuEChERS Single-Component Reference Standards

Concentration is µg/mL.

Compound	CAS #	Solvent	Conc.	cat.#
PCB 18 (5 mL)	37680-65-2	ACN	50	33255
PCB 28 (5 mL)	7012-37-5	ACN	50	33256
PCB 52 (5 mL)	35693-99-3	ACN	50	33257
PCB 138 (5 mL)	35065-28-2	ACN	50	33262
PCB 153 (5 mL)	35065-27-1	ACN	50	33263
triphenylmethane (5 mL)	519-73-3	ACN	10	33260
triphenylphosphate (5 mL)	115-86-6	ACN	20	33258
tris(1,3-dichloroisopropyl)phosphate (5 mL)	13674-87-8	ACN	50	33259

ACN = acetonitrile



QuEChERS, cont.

QuEChERS Standards for AOAC Official Method 2007.01

- Ready to use for generating test mixes, calibration standards, and spiking experiments.
- Reliable standards produced according to specifications defined in AOAC Official Method 2007.01.
- Cost-effective QuEChERS standards can be used without dilutions for greater lab efficiency.

Following QuEChERS methods is even quicker and easier when you use Restek® method-specific chemical standards for AOAC Official Method 2007.01 (Pesticide Residues in Foods by Acetonitrile Extraction and Partitioning with Magnesium Sulfate). Our suite of AOAC QuEChERS standards includes internal standards mix, triphenylphosphate (TPP) solution, and QC spike mix. Each standard can be used directly without dilutions because they are formulated to the exact concentrations prescribed by AOAC Method 2007.01.

AOAC QuEChERS IS Solution (2 components)

α-BHC-d6 (α-HCH-d6) (86194-41-4)
Parathion-d10 (350820-04-1)

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

cat.# 31963 (ea.)

AOAC QuEChERS Triphenylphosphate Solution

Triphenylphosphate (115-86-6)

2 µg/mL in acetonitrile:acetic acid (99:1), 5 mL/ampul

cat.# 31964 (ea.)

AOAC QuEChERS QC Spike Mix (27 components)

Atrazine (1912-24-9)	Imidacloprid (138261-41-3)
Azoxystrobin (131860-33-8)	Kresoxim methyl (143390-89-0)
Bifenthrin (82657-04-3)	Linuron (330-55-2)
Carbaryl (Sevin) (63-25-2)	Methamidophos (10265-92-6)
Chlorothalonil (1897-45-6)	Methomyl (16752-77-5)
Chlorpyrifos (2921-88-2)	cis-Permethrin (61949-76-6)
Chlorpyrifos methyl (5598-13-0)	trans-Permethrin (61949-77-7)
lambda-Cyhalothrin (91465-08-6)	Procymidone (32809-16-8)
Cyprodinil (121552-61-2)	Pymetrozine (123312-89-0)
2,4'-DDD (53-19-0)	Tebuconazole (107534-96-3)
Dichlorvos (DDVP) (62-73-7)	Thiabendazole (148-79-8)
Endosulfan sulfate (1031-07-8)	Tolyfluanid (731-27-1)
Ethion (563-12-2)	Trifluralin (1582-09-8)
Imazalil (35554-44-0)	

40 µg/mL each in acetonitrile:acetic acid (99.9:0.1), 5 mL/ampul

cat.# 31999 (ea.)

Reference Standards Documentation Search

Search by cat.# or lot #

- SDSs
- Certificates
- Data packs

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