Featured Application: *LPGC-MS Pesticides Analysis in Strawberries*

Speed Up Multiresidue Pesticides Analysis in Food with Low-Pressure GC-MS

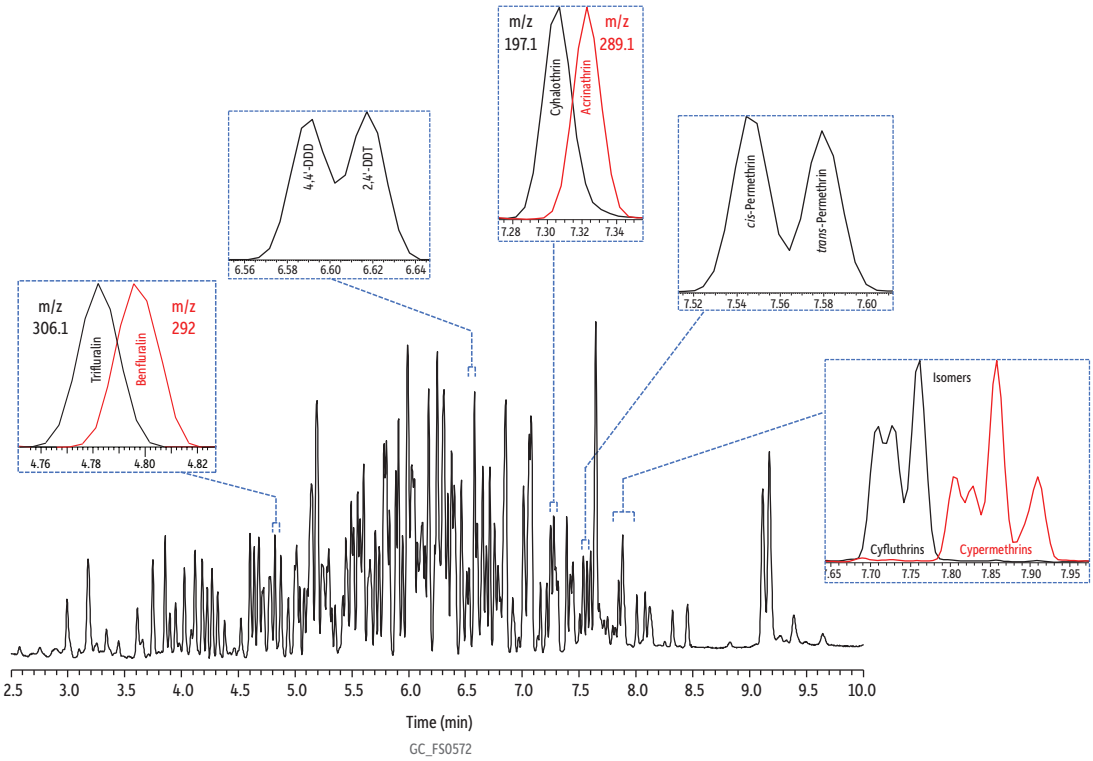
- 3x faster than conventional methods.
- Get the speed advantage of LPGC-MS with a simple column change.
- Robust, factory-coupled column kit ensures leak-free performance.
- Integrated transfer line reduces background and stabilization time.

Multiresidue pesticides analysis is a cornerstone of food safety testing, and labs are generally are under pressure to manage both a high volume of samples and rapid turnaround time requirements. This creates demand for faster GC-MS and GC-MS/MS methods, but typical approaches involve expensive instrumentation or "fast GC" techniques that have capacity issues (narrow-bore columns) or MS-compatibility concerns (hydrogen carrier gas). Low-pressure GC-MS (LPGC-MS) is option that can provide significant speed gains without these drawbacks, but, historically, the challenging setup has been a barrier to implementation. As shown in this LPGC-MS pesticides analysis of 209 compounds in strawberry, all analytes elute quickly with deltamethrin eluting last at 8.33 minutes. This time is three-fold faster than our analysis of the same extract on a conventional 30 m, 0.25 mm ID, 0.25 µm 5-type column where deltamethrin was again the final compound and eluted at 26.34 minutes.

This LPGC-MS pesticides analysis utilizes a unique low-pressure GC column kit that is comprised of a narrow restrictor column (5 m x 0.18 mm ID) that is factory coupled to a wider Rtx-5ms analytical column (15 m, 0.53 mm ID, 1 µm plus 1 m integrated transfer line on the outlet end). The manufactured connection is tested to ensure leak-free performance and is more robust than manual connections. Using this kit allows the speed gains of LPGC-MS to be obtained by making a simple column change and updating the instrument method with the new column dimensions, oven ramp, and flow rates. Note that for this particular LPGC-MS pesticides analysis, the GC oven must be capable of a 35 °C/min ramp rate at oven temperatures in excess of 300 °C. For 120V ovens, an oven insert kit will be necessary to achieve this rate.

While this LPGC-MS setup provides a significant speed gain; tall, narrow peaks that may improve sensitivity; and high capacity from the thick film analytical column, the overall plate count will be somewhat lower than on conventional columns. Although peak resolution will be lower with LPGC-MS, the mass spectrometer can offset this effect by spectrally distinguishing most target analytes. However, it is important to note that isobaric compounds must be chromatographically separated because the MS cannot resolve them. For example, in this analysis, isobars 4-4′-DDD and 2,4′-DDT are not fully resolved, so if their separation is critical, further method development would be needed. The other highlighted separations are compounds that either have both shared and unique ion transitions (trifluralin/benfluralin and cyhalothrin/acrinathrin); are adequately separated (*cis*- and *trans*-permethrin); or are commonly reported as a group (cyfluthrin and cypermethrin isomer clusters) and thus are still quantifiable even though they may not be completely chromatographically resolved.

For busy food labs needing faster methods, the speed gains of LPGC-MS pesticides analysis are an effective way to increase sample throughput. This once-challenging setup is now much simpler to implement using a low-pressure GC column kit from Restek.



Peaks	tR (min)	Precursor Ion	Product Ion	Collision Energy	Confirmation Precursor Ion	Confirmation Product Ion	Collision Energy
1. Allidochlor	3.37	138	81	8	132	56	6
2. Dichlobenil	3.63	171	100	25	136	100.1	10
3. Biphenyl	3.75	154.1	115	25	152.1	126.1	23
4. Mevinphos	3.88	192	127.1	10	127.1	95	16
5. 3,4-Dichloroaniline	3.92	163	90	16	161	126.1	8
6. Pebulate	4.01	203	128	8	128	57	8
7. Etridiazole	4.02	211	139.9	22	182.8	139.9	16
8. N-(2,4-Dimethylphenyl) formamide	4.10	121	106	8	120	77	15
9. Tetrahydrophthalimide	4.10	151.1	80.1	6	151.1	122	10
10. Methacrifos	4.19	240	180	10	125	79	6
11. Chloroneb	4.24	206	191	10	191	113	13
12. 2-Phenylphenol	4.31	170.2	141.2	22	141	115.1	12
13. Pentachlorobenzene	4.33	250	142	30	250	179	30
14. Propachlor	4.60	176	57	8	120	77	19
15. Tecnazene	4.60	260.9	202.9	13	214.9	178.9	8
16. Diphenylamine	4.63	169.1	167.1	25	169.1	168.1	12
17. Cycloate	4.67	215	154	6	154	83	8
18. 2,3,5,6-Tetrachloroaniline	4.69	231	122	30	231	160	22
19. Chlorpropham	4.70	213.1	171.1	8	171	127.1	8
20. Ethalfluralin	4.75	316.1	276.1	10	276.1	202.1	15
21. Trifluralin	4.78	306.1	206.2	12	306.1	264.1	8
22. Benfluralin	4.80	292	160.1	20	292	264.1	8
23. Sulfotep	4.85	322	146	23	202	146	10
24. Diallate 1	4.89	234.1	150	18	234.1	192.1	12
25. Phorate	4.90	260.1	75	8	121.1	65	10
26. Diallate 2	4.95	234.1	150	18	234.1	192.1	12
27. α-BHC	5.00	219	183	8	181	145	15
28. Hexachlorobenzene	5.02	283.8	213.9	30	248.9	213.9	14
29. Dicloran	5.03	206	147.9	18	176	148	10
30. Pentachloroanisole	5.04	279.9	236.9	23	266.9	238.9	10
31. Atrazine	5.05	215	173.1	8	200.1	122.1	10
32. Clomazone	5.10	204	107	18	125	89	13
33. β-BHC	5.12	219	183	8	181	145	15
34. Profluralin	5.14	330.1	69	25	318.1	199	17
35. Terbuthylazine	5.16	229.1	173.1	8	172.8	137.9	8
36. Terbufos	5.17	231	129	23	231	175	12
37. γ-BHC	5.16	219	183	8	181	145	15
38. Propyzamide	5.18	173	109	27	173	145	13
39. Diazinon	5.19	304	179.1	12	137.1	84.1	12
40. Fonofos	5.19	246.1	137.1	8	137.1	109	6
41. Quintozene	5.19	294.8	237	15	236.8	119	22

(continued)

Column	Low-pressure GC column kit (factory-coupled restrictor column [5 m x 0.18 mm ID] and Rtx-5ms analytical column [15 m, 0.53 mm ID, 1 µm plus 1 m integrated transfer line on the outlet end]; cat.# 11800)
Sample	GC multiresidue pesticide kit (cat.# 32562) Triphenylphosphate (cat.# 33258) Anthracene (cat.# 33264)
Diluent:	Acetonitrile
Conc.:	1 µg/mL
Injection	
Inj. Vol.:	1 µL splitless (hold 0.5 min)
Liner:	Topaz 4.0 mm ID single taper inlet liner w/ wool (cat.# 23447)
Inj. Temp.:	250 °C
Oven	
Oven Temp.:	80 °C (hold 1 min) to 320 °C at 35 °C/min (hold 5 min)
Carrier Gas	He, constant flow
Flow Rate:	2 mL/min
Detector	TSQ 8000
SIM Program:	35-550 m/z
Transfer Line Temp.:	290 °C
Analyzer Type:	Quadrupole
Source Temp.:	325 °C
Solvent Delay Time:	2 min
Tune Type:	PFTBA
Ionization Mode:	EI
Instrument	Thermo Scientific TSQ 8000 Triple Quadrupole GC-MS
Notes	Sample preparation: 10 g of homogenized strawberries were fortified with the internal standards at 20 ppb and then extracted with 10 mL of acetonitrile and QuEChERS EN 15662 salts (cat.# 25850). After centrifugation, 1 mL of supernatant was added to a 2 mL dSPE vial containing magnesium sulfate and PSA (cat.# 26124) for cleanup. The cleaned extract was spiked with GC multiresidue pesticide mix at 1 ppm.

Peaks	tR (min)	Precursor Ion	Product Ion	Collision Energy	Confirmation Precursor Ion	Confirmation Product Ion	Collision Energy
42. Fluchloralin	5.21	306.1	159.7	20	306.1	264	8
43. Pentachlorobenzonitrile	5.21	275	205	30	273	238	17
44. Pyrimethanil	5.21	198.1	118.1	32	198.1	183	16
45. Tefluthrin	5.24	177	127.1	15	177	137.1	15
46. Disulfoton	5.25	153.1	97	12	88.1	59.9	6
47. Terbacil	5.26	161	144	14	160	117	8
48. Isazophos	5.29	172.1	130	10	161.1	119	8
49. δ-BHC	5.31	219	183	8	181	145	15
50. Triallate	5.32	270	186	18	268	184	20
51. Chlorothalonil	5.34	266	170	23	264	168	23
52. Anthracene (IS)	5.35	178	152	20			
53. Endosulfan ether	5.42	240.9	206	13	238.9	204	13
54. Propanil	5.44	219	163	8	217	161	8
55. Pentachloroaniline	5.45	265	194	22	263	192	20
56. Dimethachlor	5.46	197	148	8	134	105	13
57. Acetochlor	5.48	223	132	20	174	146	12
58. Transfluthrin	5.48	163	143	13	127.1	91.1	8
59. Vinclozolin	5.50	285	212	12	212	172	12
60. Chlorpyrifos methyl	5.52	286	93	22	286	207.9	12
61. Methyl parathion	5.52	263	109	10	263	136.2	8
62. Tolclofos-methyl	5.54	267	252	10	265	250	10
63. Alachlor	5.55	188	160	10	146	118	8
64. Metalaxyl	5.56	220.1	160.2	10	160.1	145.1	10
65. Propisochlor	5.56	223	132	18	162	120	13
66. Fenchlorphos	5.59	287	272	11	285	240	23
67. Heptachlor	5.59	272	237	13	100	65	12
68. Prodiamine	5.63	321	279	6	279	203	8
69. Pirimiphos methyl	5.65	305.1	180.1	8	290.1	125	22
70. Fenitrothion	5.66	277	109	16	260	125	12
71. Linuron	5.69	248	61	8	187	124	21
72. Malathion	5.69	173	99	13	127	99	6
73. Dichlofluanid	5.72	224	123	12	123	77.1	16
74. Pentachlorothioanisole	5.73	296	246	32	296	263	12
75. Metolachlor	5.76	238	162	10	162	133	13
76. Chlorpyrifos	5.77	314	257.9	12	196.9	168.9	14
77. Fenthion	5.77	278	109	18	278	169	17
78. Parathion	5.78	291.2	109.1	10	109	81	8
79. Anthraquinone	5.79	208.1	180.1	10	180.1	152.1	12
80. Triadimefon	5.79	208	110.9	24	208	180.8	10
81. Aldrin	5.80	298	263	8	263	193	31
82. Chlorthal-dimethyl	5.81	331.8	301	8	298.9	220.9	24
83. 4,4'-Dichlorobenzophenone	5.81	139	75	27	111	75.1	12
84. Pirimiphos ethyl	5.85	318.2	166.1	12	304.1	168.1	12
85. Fenson	5.86	268	77.1	18	141	77.1	8
86. Cyprodinil	5.87	225.2	209.8	12	224.1	208.1	20
87. Diphenamid	5.88	239	167	8	167	115	40
88. Isopropalin	5.89	280.1	118.1	25	280.1	238.1	8
89. MGK 264 1	5.89	164.1	80	24	164.1	93.1	12
90. Bromophos-methyl	5.90	331	316	13	329	314	13
91. Chlozolinate	5.95	331	259.1	8	186	145	16
92. Pendimethalin	5.95	281.1	252.2	8	252.1	162.1	10
93. Bioallethrin	5.96	136.1	93	11	123.2	81.1	8
94. Fipronil	5.97	367	213	30	369	215	30
95. MGK 264 2	5.97	164	67	10	164.1	80	24
96. Isodrin	5.97	260.9	190.9	28	193	123	30
97. Metazachlor	5.97	209	132	15	133	117	25
98. Penconazole	5.97	248.1	192	16	159	89	30
99. Chlorfenvinphos 1	6.04	323	267	10	267	159	15
100. Tolylfluanid	6.05	240	137	10	238	137	10
101. Bromfenvinphos-methyl	6.06	295	109	15	109	79	5
102. Heptachlor epoxide	6.07	353	263	13	263	193	29
103. Quinalphos	6.07	298	156.1	8	146.1	118.1	10
104. Triadimenol	6.07	168.1	70.1	10	128	65.1	22
105. Triflumizole	6.09	205.9	179	14	179	143.8	14
106. Captan	6.10	149	105	6	106.8	79	12
107. Procymidone	6.11	283	67.1	28	283	96	10
108. Folpet	6.14	259.9	130	16	103.9	76	10
109. Chlorbenside	6.15	268	125.1	8	125	89.1	17
110. Bromophos-ethyl	6.17	358.9	303	17	330.9	303	8
111. *trans*-Chlordane	6.19	375	266	18	272	237	12
112. Paclobutrazol	6.19	237.8	127	10	236.1	125.1	12
113. 2,4'-DDE	6.19	316	246	15	246	176	30
114. Tetrachlorvinphos	6.20	333	109	17	331	109	20
115. Fenamiphos	6.25	303.1	195.1	8	217	202	9
116. Flutolanil	6.26	281	173	10	173	145	14
117. Prothiofos	6.26	309	239	15	267	221	16
118. *cis*-Chlordane	6.27	375	266	18	272	237	12
119. Bromfenvinphos	6.27	325	269	10	323	267	10
120. Fludioxonil	6.27	248	127	30	153.8	127	8
121. Flutriafol	6.27	219.1	123	14	123.1	95	12
122. Iodofenphos	6.27	377	332	30	377	362	15
123. Pretilachlor	6.27	262	202	8	162	132	18
124. Profenofos	6.27	339	188	30	337	267	13
125. Chlorfenvinphos 2	6.27	323	267	10	267	159	15
126. Endosulfan I	6.28	241	206	10	195	159	6

(continued)

Peaks	tR (min)	Precursor Ion	Product Ion	Collision Energy	Confirmation Precursor Ion	Confirmation Product Ion	Collision Energy
127. *trans*-Nonachlor	6.28	409	263	25	409	300	23
128. Chlorfenson	6.29	302	175	8	175	111	8
129. Oxadiazon	6.33	258	175	8	175	112	13
130. Oxyfluorfen	6.34	300	223	15	252.1	146.1	33
131. Myclobutanil	6.38	179	125	14	179	152	8
132. Bupirimate	6.39	316.2	208.2	8	273.1	193.2	8
133. Flusilazole	6.39	233.1	164.9	18	206.1	137	20
134. 4,4'-DDE	6.40	316	246	15	246	176	30
135. Tricyclazole	6.41	189	135.2	18	189	162	12
136. 2,4'-DDD	6.42	235	165.1	21	235	199.1	16
137. Dieldrin	6.42	277	241	8	263	193	34
138. Fluazifop-P-butyl	6.42	383.1	268.2	8	383.1	282.2	12
139. Chlorfenapyr	6.46	247	227.1	12	137	75	28
140. Ethylan	6.46	223	167	12	223	193	28
141. Nitrofen	6.49	283	202	10	202	139.1	20
142. Chlorthiophos 1	6.50	256.9	165	26	256.9	239	12
143. Chlorobenzilate	6.52	251	139	14	139	111	12
144. Endrin	6.55	263	193	30	245	173	25
145. Ethion	6.58	231	129	24	153	97	10
146. 4,4'-DDD	6.59	235	165.1	21	235	199.1	16
147. Chlorthiophos 2	6.61	325	269	14	297	269	8
148. 2,4'-DDT	6.62	235	165.1	21	235	199.1	16
149. Triazophos	6.65	256.9	161.7	8	161	134.1	8
150. *cis*-Nonachlor	6.65	409	263	25	409	300	23
151. Sulprofos	6.66	322	156	8	156	141	13
152. Carfentrazone ethyl	6.67	340.2	312.2	10	330	310.1	8
153. Endrin aldehyde	6.68	344.9	243.1	17	344.9	244.9	14
154. 4,4'-Methoxychlor olefin	6.70	308	223.1	30	238.1	152.1	35
155. Carbophenothion	6.70	342	157	10	125	97	6
156. Norflurazon	6.74	303	145	17	145	95	18
157. Edifenphos	6.75	310	109	29	173	109	8
158. Lenacil	6.76	153	135.7	14	135.8	52.9	18
159. 4,4'-DDT	6.61	235	165.1	21	235	199.1	16
160. Endosulfan sulfate	6.81	272	237	10	241	206	8
161. Hexazinone	6.83	171.1	71.1	16	128	83	10
162. Piperonyl butoxide	6.83	176.1	103	26	176.1	131.1	14
163. Propargite	6.83	201.1	81.1	10	135.1	107	14
164. Resmethrin	6.83	143.1	128	10	123.2	81.2	8
165. Tebuconazole	6.85	250.1	125.2	22	125	89	16
166. Nitralin	6.95	316.1	274	8	274	216.2	6
167. Captafol	6.99	150.8	78.9	18	79	77.1	12
168. TPP (IS)	6.99	326	169	30	326	215	20
169. Iprodione	7.01	314	245	14	187	124.1	24
170. Bifenthrin	7.05	181.1	166.1	10	165.1	115.1	30
171. Fenpropathrin	7.05	265	210	8	181	152	24
172. Pyridaphenthion	7.05	340.1	199.1	8	199.1	77.1	26
173. Tetramethrin	7.06	164	77	25	164	107	12
174. Bromopropylate	7.08	340.8	183	15	183	154.9	12
175. Azinphos-ethyl	7.80	160	77	18	132	77	12
176. EPN	7.11	169	77	22	169	141	8
177. Phosmet	7.11	160	77	24	160	133	10
178. Methoxychlor	7.12	227	141	33	227	169	25
179. Tebufenpyrad	7.12	333	276	8	276	171	10
180. Endrin ketone	7.13	317	101	21	315	279	8
181. Phenothrin	7.19	183.1	168.1	12	123.2	81.1	8
182. Tetradifon	7.25	227	199	10	159	131	10
183. Pyriproxyfen	7.28	226.1	186.1	16	136.1	78	20
184. Phosalone	7.29	367	111	36	182	111	14
185. Leptophos	7.31	377	269	37	171	77	18
186. λ-Cyhalothrin	7.31	197.1	141.1	10	197	91	26
187. Acrinathrin	7.32	289.1	93	10	289	91	24
188. Pyrazophos	7.41	265.1	210.1	10	221.1	193.1	10
189. Mirex	7.44	274	239	15	272	237	15
190. Fenarimol	7.46	219	107.1	12	139	111	16
191. Azinphos-methyl	7.46	160	77	18	132	77	12
192. Pyraclofos	7.47	360	139	14	194	138	18
193. *cis*-Permethrin	7.54	183.1	153.1	12	163	127.1	6
194. trans-Permethrin	7.58	183.1	153.1	12	163	127.1	6
195. Pyridaben	7.62	147	117	20	147	119	8
196. Coumaphos	7.66	362	109	17	210	182	10
197. Fluquinconazole	7.66	340	108	42	340	298	14
198. Prochloraz	7.67	308	70	13	180	138	12
199. Cyfluthrin	7.73	226.1	199	8	226	151	30
200. Cypermethrin	7.83	181.1	127	28	181.1	152.1	20
201. Flucythrinate 1	7.86	199.1	157.1	8	157.1	107.1	13
202. Acequinocyl	7.89	342.4	188.1	14	188	132	10
203. Etofenprox	7.90	163.1	107	18	163.1	135.1	10
204. Flucythrinate 2	7.91	199.1	157.1	8	157.1	107.1	13
205. Fluridone	8.03	328.1	127.1	40	328.1	259	26
206. Fenvalerate	8.10	169.1	127.1	10	167.1	125	8
207. Tau-fluvalinate	8.15	252	55	17	250.1	55	23
208. Fenvalerate	8.16	169.1	127.1	10	167.1	125	8
209. Deltamethrin	8.33	252.9	93.1	19	181.1	152	20

Featured Products

Reference Standards	Sample Handling	Analytical Column	Maintenance & Accessories
			
GC Multiresidue Standards Kit cat.# 32562	**Q-sep QuEChERS Salts** cat.# 25850 **Q-sep QuEChERS dSPE Tubes** cat.# 26124	**Low-Pressure GC Column Kit** cat.# 11800	**Topaz Inlet Liner** cat.# 23447 **0.8 mm ID Vespel/ Graphite Ferrules for 0.53 mm ID Columns** cat.# 20213

Low-Pressure GC (LPGC) Column Kit

11800

Leverage Your MS Vacuum to Significantly Speed Up Separations

- 3x faster multiresidue pesticides analysis in foods.
- Factory-coupled, leak-free kit makes setting up LPGC as simple as a column change.
- Ideal for speeding up GC-MS and GC-MS/MS methods.
- Integrated transfer line reduces background and stabilization time.

Restek's low-pressure GC column kit has been specifically designed to easily install into your GC-MS or GC-MS/MS system, making it simpler to take advantage of the speed boost that is possible with low-pressure GC-MS (LPGC-MS). This kit is comprised of two factory-coupled columns:

- Restrictor column: 5 m length of 0.18 mm ID Hydroguard tubing.
- Analytical column with integrated transfer line: 15 m, 0.53 mm ID, 1 µm Rtx-5ms analytical column plus 1 m integrated transfer lines on the outlet end (16 m total length of 0.53 mm ID tubing).

These two lengths of tubing (0.18 mm ID restrictor column and 0.53 mm ID analytical column with integrated transfer line) are pre-connected by Restek using a robust, inert, zero-dead-volume connector and then individually tested to ensure leak-free performance for LPGC-MS applications.

ID	Temp. Limits	Includes	qty.	cat.#
Low-Pressure GC (LPGC) Column Kit				
	-60 to 340/340 °C	Factory-coupled restrictor column (5 m x 0.18 mm ID) and Rtx-5ms analytical column (15 m, 0.53 mm ID, 1 µm plus 1 m integrated transfer line on the outlet end)	kit	11800

GC Multiresidue Pesticide Kit

- Accurately identify and quantify pesticide residues by GC-MS/MS in fruits, vegetables, botanicals, and herbals such as 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.

32562

Cat.# 32563: GC Multiresidue Pesticide Standard #1 (16 components)
Organophosphorus Compounds
100 µg/mL each in toluene, 1 mL/ampul
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 (89784-60-1)
Pyrazophos (13457-18-6)
Pyridaphenthion (119-12-0)
Quinalphos (13593-03-8)

Cat.# 32564: GC Multiresidue Pesticide Standard #2 (40 components)
Organochlorine Compounds
100 µg/mL each in toluene, 1 mL/ampul
Aldrin (309-00-2)
α-BHC (319-84-6)
β-BHC (319-85-7)
δ-BHC (319-86-8)
γ-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)
Heptachlor (76-44-8)
Heptachlor epoxide (isomer B) (1024-57-3)
Hexachlorobenzene (118-74-1)
Isodrin (465-73-6)
2,4'-Methoxychlor (30667-99-3)
4,4'-Methoxychlor olefin (2132-70-9)
Mirex (2385-85-5)
cis-Nonachlor (5103-73-1)
trans-Nonachlor (39765-80-5)
Pentachloroanisole (1825-21-4)
Pentachlorobenzene (608-93-5)
Pentachlorothioanisole (1825-19-0)
Tetradifon (116-29-0)

Cat.# 32565: GC Multiresidue Pesticide Standard #3 (25 components)
Organonitrogen Compounds
100 µg/mL each in toluene:acetonitrile (99:1), 1 mL/ampul
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)
Isopropalin (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)
Tolylfluanid (731-27-1)
Trifluralin (1582-09-8)

Cat.# 32566: GC Multiresidue Pesticide Standard #4 (28 components)
Organonitrogen Compounds
100 µg/mL each in toluene, 1 mL/ampul
Acetochlor (34256-82-1)
Alachlor (15972-60-8)
Allidochlor (93-71-0)
Clomazone (Command) (81777-89-1)
Cycloate (1134-23-2)
Diallate (*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)
Pretilachlor (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
100 µg/mL each in toluene, 1 mL/ampul
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)
Procymidone (32809-16-8)
Propargite (2312-35-8)
Pyrimethanil (53112-28-0)
Pyriproxyfen (95737-68-1)
Tebuconazole (107534-96-3)
Terbacil (5902-51-2)
Terbuthylazine (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
100 µg/mL each in toluene, 1 mL/ampul
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
100 µg/mL each in toluene, 1 mL/ampul
Acequinocyl (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
100 µg/mL each in toluene, 1 mL/ampul
Bromfenvinfos-methyl (13104-21-7)
Bromfenvinphos (33399-00-7)
Bromophos ethyl (4824-78-6)
Bromophos methyl (2104-96-3)
Carbophenothion (786-19-6)
Chlorfenvinphos (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)
Fenthion (55-38-9)
Iodofenphos (18181-70-9)
Leptophos (21609-90-5)
Malathion (121-75-5)
Methacrifos (62610-77-9)
Profenofos (41198-08-7)
Prothiofos (34643-46-4)
Sulfotepp (3689-24-5)
Sulprofos (35400-43-2)
Terbufos (13071-79-9)
Tetrachlorvinphos (22248-79-9)
Tolclofos-methyl (57018-04-9)

Cat.# 32571: GC Multiresidue Pesticide Standard #9 (8 components)
Organophosphorus Compounds
100 µg/mL each in toluene, 1 mL/ampul
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)

Description	Conc. in Solvent	CRM?	Min Shelf Life on Ship Date	Shipping Conditions	Storage Temp.	qty.	cat.#
GC Multiresidue Pesticide Kit	Contains 1 mL each of these mixtures.	Yes	6 months	Ambient	10 °C or colder	kit	32562

Q-sep QuEChERS dSPE Tubes for Extract Cleanup

Fast, Simple Sample Prep for Multiresidue Pesticide Analysis

- Packaged in foil subpacks of 10 for enhanced protection and storage stability.
- Ready-to-use tubes, no glassware required.
- Pre-weighed, ultra-pure sorbents.
- Support original unbuffered, AOAC (2007.01), European (EN 15662), and mini-multiresidue QuEChERS methods.

26215

Description	Material	Method	Type	Volume	qty.	Similar to Part #	cat.#
Foodstuffs with fats and waxes (e.g., cereals, avocado, nuts, seeds, and dairy)							
Q-sep QuEChERS dSPE Tubes	150 mg $MgSO_4$, 25 mg PSA, 25 mg C18-EC	Mini-multiresidue	2 mL Micro-Centrifuge Tubes Prefilled with dSPE Materials for Cleanup (1 mL Extract)	2 mL	100-pk.	Agilent 5982-5121	26216
	150 mg $MgSO_4$, 50 mg C18-EC	—	2 mL Micro-Centrifuge Tubes Prefilled with dSPE Materials for Cleanup (1 mL Extract)	2 mL	100-pk.		26242
	150 mg $MgSO_4$, 50 mg PSA, 50 mg C18-EC	AOAC 2007.01	2 mL Micro-Centrifuge Tubes Prefilled with dSPE Materials for Cleanup (1 mL Extract)	2 mL	100-pk.		26125
	1200 mg $MgSO_4$, 400 mg PSA, 400 mg C18-EC	AOAC 2007.01	15 mL Centrifuge Tubes Prefilled with dSPE Materials for Cleanup (6 mL and 8 mL Extract)	15 mL	50-pk.	Agilent 5982-5158	26221
	1200 mg $MgSO_4$, 400 mg C18-EC	—	15 mL Centrifuge Tubes Prefilled with dSPE Materials for Cleanup (6 mL and 8 mL Extract)	15 mL	50-pk.		26244
	900 mg $MgSO_4$, 150 mg PSA, 150 mg C18-EC	—	15 mL Centrifuge Tubes Prefilled with dSPE Materials for Cleanup (6 mL and 8 mL Extract)	15 mL	50-pk.		26226
General fruits and vegetables (e.g., celery, head lettuce, cucumber, melon)							
Q-sep QuEChERS dSPE Tubes	150 mg $MgSO_4$, 50 mg PSA	AOAC 2007.01	2 mL Micro-Centrifuge Tubes Prefilled with dSPE Materials for Cleanup (1 mL Extract)	2 mL	100-pk.		26124
	150 mg $MgSO_4$, 25 mg PSA	Original unbuffered, EN 15662, mini-multiresidue	2 mL Micro-Centrifuge Tubes Prefilled with dSPE Materials for Cleanup (1 mL Extract)	2 mL	100-pk.	Agilent 5982-5021	26215
	1200 mg $MgSO_4$, 400 mg PSA	AOAC 2007.01	15 mL Centrifuge Tubes Prefilled with dSPE Materials for Cleanup (6 mL and 8 mL Extract)	15 mL	50-pk.		26220
	900 mg $MgSO_4$, 150 mg PSA	Original unbuffered, EN 15662	15 mL Centrifuge Tubes Prefilled with dSPE Materials for Cleanup (6 mL and 8 mL Extract)	15 mL	50-pk.	Agilent 5982-5056	26223
General purpose (wide variety of sample types, including fatty and pigmented fruits and vegetables)							
Q-sep QuEChERS dSPE Tubes	150 mg $MgSO_4$, 50 mg PSA, 50 mg C18-EC, 7.5 mg GCB	—	2 mL Micro-Centrifuge Tubes Prefilled with dSPE Materials for Cleanup (1 mL Extract)	2 mL	100-pk.		26243
	900 mg $MgSO_4$, 300 mg PSA, 300 mg C18-EC, 45 mg GCB	—	15 mL Centrifuge Tubes Prefilled with dSPE Materials for Cleanup (6 mL and 8 mL Extract)	15 mL	50-pk.		26245
Highly pigmented fruits and vegetables (e.g., red peppers, spinach, blueberries)							
Q-sep QuEChERS dSPE Tubes	150 mg $MgSO_4$, 25 mg PSA, 7.5 mg GCB	Mini-multiresidue, EN 15662	2 mL Micro-Centrifuge Tubes Prefilled with dSPE Materials for Cleanup (1 mL Extract)	2 mL	100-pk.		26218
	150 mg $MgSO_4$, 50 mg PSA, 50 mg C18-EC, 50 mg GCB	AOAC 2007.01	2 mL Micro-Centrifuge Tubes Prefilled with dSPE Materials for Cleanup (1 mL Extract)	2 mL	100-pk.		26219
	900 mg $MgSO_4$, 150 mg PSA, 45 mg GCB	EN 15662	15 mL Centrifuge Tubes Prefilled with dSPE Materials for Cleanup (6 mL and 8 mL Extract)	15 mL	50-pk.		26225
	900 mg $MgSO_4$, 300 mg PSA, 150 mg GCB	—	15 mL Centrifuge Tubes Prefilled with dSPE Materials for Cleanup (6 mL and 8 mL Extract)	15 mL	50-pk.		26126
Pigmented fruits and vegetables (e.g., strawberries, sweet potatoes, and tomatoes)							
Q-sep QuEChERS dSPE Tubes	150 mg $MgSO_4$, 25 mg PSA, 2.5 mg GCB	Mini-multiresidue, EN 15662	2 mL Micro-Centrifuge Tubes Prefilled with dSPE Materials for Cleanup (1 mL Extract)	2 mL	100-pk.		26217
	150 mg $MgSO_4$, 50 mg PSA, 50 mg GCB	AOAC 2007.01	2 mL Micro-Centrifuge Tubes Prefilled with dSPE Materials for Cleanup (1 mL Extract)	2 mL	100-pk.		26123
	1200 mg $MgSO_4$, 400 mg PSA, 400 mg C18-EC, 400 mg GCB	AOAC 2007.01	15 mL Centrifuge Tubes Prefilled with dSPE Materials for Cleanup (6 mL and 8 mL Extract)	15 mL	50-pk.		26222
	900 mg $MgSO_4$, 150 mg PSA, 15 mg GCB	EN 15662	15 mL Centrifuge Tubes Prefilled with dSPE Materials for Cleanup (6 mL and 8 mL Extract)	15 mL	50-pk.		26224

Note: No entry in the Method column refers to dSPE formulations not specifically included in one of the cited references. These products can be used to accommodate the various needs of specific matrices not directly met by the cited references.

Multiple sorbents are used to extract different types of interferences.
$MgSO_4$—removes excess water.
PSA (primary and secondary amine)—removes sugars, fatty acids, organic acids, and anthocyanine pigments.
C18-EC (end-capped)—removes nonpolar interferences.
GCB (graphitized carbon black)—removes pigments, sterols, and nonpolar interferences.

25847

258479

ordering notes

Certificates of analysis for this product are provided electronically. To view and download your certificate, simply visit www.restek.com/documentation

Q-sep QuEChERS Extraction Salts

- Free-flowing salts transfer easily and completely.
- Easy-open packets eliminate the need for a second empty tube for salt transfer.
- Convenient slim packets fit perfectly into tubes to prevent spills.
- Ready-to-use tubes, no glassware required.
- Pre-weighed, ultra-pure extraction salts.
- Ideal for original unbuffered, AOAC (2007.01), and European (EN 15662) QuEChERS methods.

QuEChERS methods are fast, easy, and cost-effective, and Restek Q-sep products make QuEChERS procedures even easier. No specialized glassware is required when you're using Q-sep extraction packets and tubes. Free-flowing extraction salts and salt packets that fit easily into the extraction tubes make transferring the salts to your sample mess free and easy.

Description	Material	Method	qty.	cat.#
Q-sep QuEChERS Extraction Kit	4 g $MgSO_4$, 1 g NaCl with 50 mL Centrifuge Tube	Original unbuffered	50 packets & 50 tubes	25848
Q-sep QuEChERS Extraction Salt Packets Only	4 g $MgSO_4$, 1 g NaCl	Original unbuffered	50 packets	25847
Q-sep QuEChERS Extraction Kit	4 g $MgSO_4$, 1 g NaCl, 1 g TSCD, 0.5 g DHS with 50 mL Centrifuge Tube	European EN 15662	50 packets & 50 tubes	25850
Q-sep QuEChERS Extraction Salt Packets Only	4 g $MgSO_4$, 1 g NaCl, 1 g TSCD, 0.5 g DHS	European EN 15662	50 packets	25849
Q-sep QuEChERS Extraction Kit	6 g $MgSO_4$, 1.5 g NaOAc with 50 mL Centrifuge Tube	AOAC 2007.01	50 packets & 50 tubes	25852
Q-sep QuEChERS Extraction Salt Packets Only	6 g $MgSO_4$, 1.5 g NaOAc	AOAC 2007.01	50 packets	25851

DHS – disodium hydrogen citrate sesquihydrate; $MgSO_4$ – magnesium sulfate; NaCl – sodium chloride; NaOAc – sodium acetate; TSCD – trisodium citrate dihydrate

Topaz GC Inlet Liners

Topaz GC inlet liners feature revolutionary technology and inertness to deliver you the next level of True Blue Performance:

- **Deactivation**—unbelievably low breakdown for accurate and precise low-level GC analyses.
- **Reproducibility**—unbeatable manufacturing controls and QC testing for superior reliability across compound classes.
- **Productivity**—unparalleled cleanliness for maximized GC uptime and lab throughput.
- **100% Satisfaction**—if a liner doesn't perform to your expectations, we will replace it or credit your account.*

Patented

Topaz 4.0 mm ID Single Taper Inlet Liner w/ Wool

for Thermo TRACE 1300/1310 GCs equipped with SSL inlets

ID x OD x Length	Packing	qty	Similar to Part #	cat.#
Single Taper, Premium Deactivation, Borosilicate Glass				
4.0 mm x 6.5 mm x 78.5 mm	Quartz Wool	5-pk.	Thermo Fisher Scientific 453A1925-UI	23447

* 100% SATISFACTION GUARANTEE: If your Topaz inlet liner does not perform to your expectations for any reason, simply contact Restek Technical Service or your local Restek representative and provide a sample chromatogram showing the problem. If our GC experts are not able to quickly and completely resolve the issue to your satisfaction, you will be given an account credit or replacement product (same cat.#) along with instructions for returning any unopened product. (Do not return product prior to receiving authorization.) For additional details about Restek's return policy, visit www.restek.com/warranty

Vespel/Graphite Capillary Ferrules for 1/16-Inch Compression-Type Fittings

Description	Ferrule ID	Fits Column ID	Fitting Size	Material	qty.	Similar to Part #	cat.#
Ferrules	0.8 mm	0.45/0.53 mm	1/16"	VG2, 60% Vespel/40% Graphite	10-pk.	Grace 5124716, 100/0.8-VG2	20213

Related Products

GC Accelerator Oven Insert Kit, only if using a 120V Agilent GC oven

for Agilent 5890, 6890, 7890, and 8890 instruments

- Get the same GC separation in less time—use a GC Accelerator kit and the *EZ*GC method translator to accurately convert methods to a scaled-down column format.
- Scaled-down methods let you speed up analysis time and increase sample throughput without capital investment.
- GC Accelerator kit installs easily without damaging the GC column or interfering with the MS interface.

23849

Designed with GC-MS users in mind, the GC Accelerator kit provides a simple way to speed up sample analysis. By reducing oven volume, these inserts allow faster ramp rates to be attained, which reduces oven cycle time and allows for increased sample throughput and more capacity to process rush samples. When faster ramp rates are used, existing methods can be accurately scaled down to smaller, high-efficiency, narrow-bore columns using Restek's *EZ*GC method translator. With a scaled-down column, a properly translated method, and a GC Accelerator kit, you can obtain the same chromatographic separation—often with greater sensitivity—in a fraction of the time without making a capital investment.

Description	Instrument	qty.	cat.#
GC Accelerator Oven Insert Kit	for Agilent 5890, 6890, 7890, and 8890 instruments	kit	23849

QuEChERS Performance Standards Kit

- Designed for use in all QuEChERS methods for pesticides in fruits and vegetables, including the original unbuffered method, AOAC 2007.01, and EN 15662.
- 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.
- Ideal for initial method evaluations and ongoing method performance validations.
- Analytes are divided into three ampuls based on compatibility for maximum stability and shelf life.*
- Precise formulations improve 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.

**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.*

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

Cat.# 31153: QuEChERS Performance Standard A (16 components)
Acephate (30560-19-1)
Azinphos methyl (86-50-0)
Chlorpyrifos (2921-88-2)
Coumaphos (56-72-4)
Diazinon (333-41-5)
Dichlofluanid (1085-98-9)
Dichlorvos (DDVP) (62-73-7)
Dimethoate (60-51-5)
Fenthion (55-38-9)
Malathion (121-75-5)
Methamidophos (10265-92-6)
Mevinphos (7786-34-7)
Omethoate (1113-02-6)
Phosalone (2310-17-0)
Pirimiphos methyl (29232-93-7)
Propargite (2312-35-8)

Cat.# 31154: QuEChERS Performance Standard B (7 components)
gamma-BHC (Lindane) (58-89-9)
Chlorothalonil (1897-45-6)
4,4'-DDT (50-29-3)
Dicofol (Kelthane) (115-32-2)
Endosulfan sulfate (1031-07-8)
Endrin (72-20-8)
2-Phenylphenol (90-43-7)

Cat.# 31155: QuEChERS Performance Standard C (17 components)
Bifenthrin (82657-04-3)
Captan (133-06-2)
Carbaryl (Sevin) (63-25-2)
Cyprodinil (121552-61-2)
Deltamethrin (52918-63-5)
Fenhexamid (126833-17-8)
Fenpropathrin (39515-41-8)
Folpet (133-07-3)
Imazalil (35554-44-0)
Iprodione (36734-19-7)
Metalaxyl (57837-19-1)
Methiocarb (2032-65-7)
Myclobutanil (88671-89-0)
cis-Permethrin (61949-76-6)
trans-Permethrin (61949-77-7)
Thiabendazole (148-79-8)
Vinclozolin (50471-44-8)

Description	Conc. in Solvent	CRM?	Min Shelf Life on Ship Date	Shipping Conditions	Storage Temp.	qty.	cat.#
QuEChERS Performance Standards Kit	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.	Yes	3 months	Ambient	10 °C or colder	kit	31152

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)

Conc. in Solvent	CRM?	Min Shelf Life on Ship Date	Max Shelf Life on Ship Date	Shipping Conditions	Storage Temp.	qty.	cat.#
AOAC QuEChERS IS Solution							
40 µg/mL each in acetonitrile, 5 mL/ampul	Yes	6 months	18 months	Ambient	10 °C or colder	ea.	31963

QuEChERS Reference Standards

Ready to use for QuEChERS extractions—no dilutions necessary.

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-MS Analysis

(6 components)

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

Conc. in Solvent	CRM?	Min Shelf Life on Ship Date	Max Shelf Life on Ship Date	Shipping Conditions	Storage Temp.	qty.	cat.#
QuEChERS Internal Standard Mix for GC/MS Analysis							
In acetonitrile, 5 mL/ampul	Yes	6 months	75 months	Ambient	10 °C or colder	ea.	33267

Linuron-d6 Standard

Isotopically labeled to provide the best approach for pesticide residue quantification.

Linuron-d6 (1219804-76-8)

CAS #	Conc. in Solvent	CRM?	Min Shelf Life on Ship Date	Max Shelf Life on Ship Date	Shipping Conditions	Storage Temp.	qty.	cat.#
1219804-76-8	100 µg/mL in acetonitrile, 1 mL/ampul	Yes	6 months	31 months	Ambient	10 °C or colder	ea.	31990

Diazinon-d10 Standard

Isotopically labeled to provide the best approach for pesticide residue quantification.

Diazinon-d10 (diethyl-d10) (100155-47-3)

CAS #	Conc. in Solvent	CRM?	Min Shelf Life on Ship Date	Max Shelf Life on Ship Date	Shipping Conditions	Storage Temp.	qty.	cat.#
100155-47-3	100 µg/mL in acetonitrile, 1 mL/ampul	Yes	6 months	36 months	Ambient	10 °C or colder	ea.	31986

Atrazine-d5 Standard

Isotopically labeled to provide the best approach for pesticide residue quantification.

Atrazine-d5 (163165-75-1)

CAS #	Conc. in Solvent	CRM?	Min Shelf Life on Ship Date	Max Shelf Life on Ship Date	Shipping Conditions	Storage Temp.	qty.	cat.#
163165-75-1	100 µg/mL in acetonitrile, 1 mL/ampul	Yes	6 months	36 months	Ambient	10 °C or colder	ea.	31984

Triphenylphosphate

Triphenylphosphate (115-86-6)

CAS #	Conc. in Solvent	CRM?	Min Shelf Life on Ship Date	Max Shelf Life on Ship Date	Shipping Conditions	Storage Temp.	qty.	cat.#
115-86-6	20 µg/mL in acetonitrile, 5 mL/ampul	Yes	6 months	71 months	Ambient	10 °C or colder	ea.	33258
115-86-6	1000 µg/mL in acetone, 1 mL/ampul	Yes	6 months	71 months	Ambient	10 °C or colder	ea.	32281

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