



Accuracy Starts Here



Agilent QuEChERS Selection Guide





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Tips & Tools

Learn the core concepts surrounding Solid Phase Extraction and best practices for Sample Prep. View the video at www.agilent.com/chem/spevideo

Learn about the new generation of polymeric SPE products, Agilent Bond Elut Plexa. Request the brochure using publication number 5990-8589EN.





QuEChERS

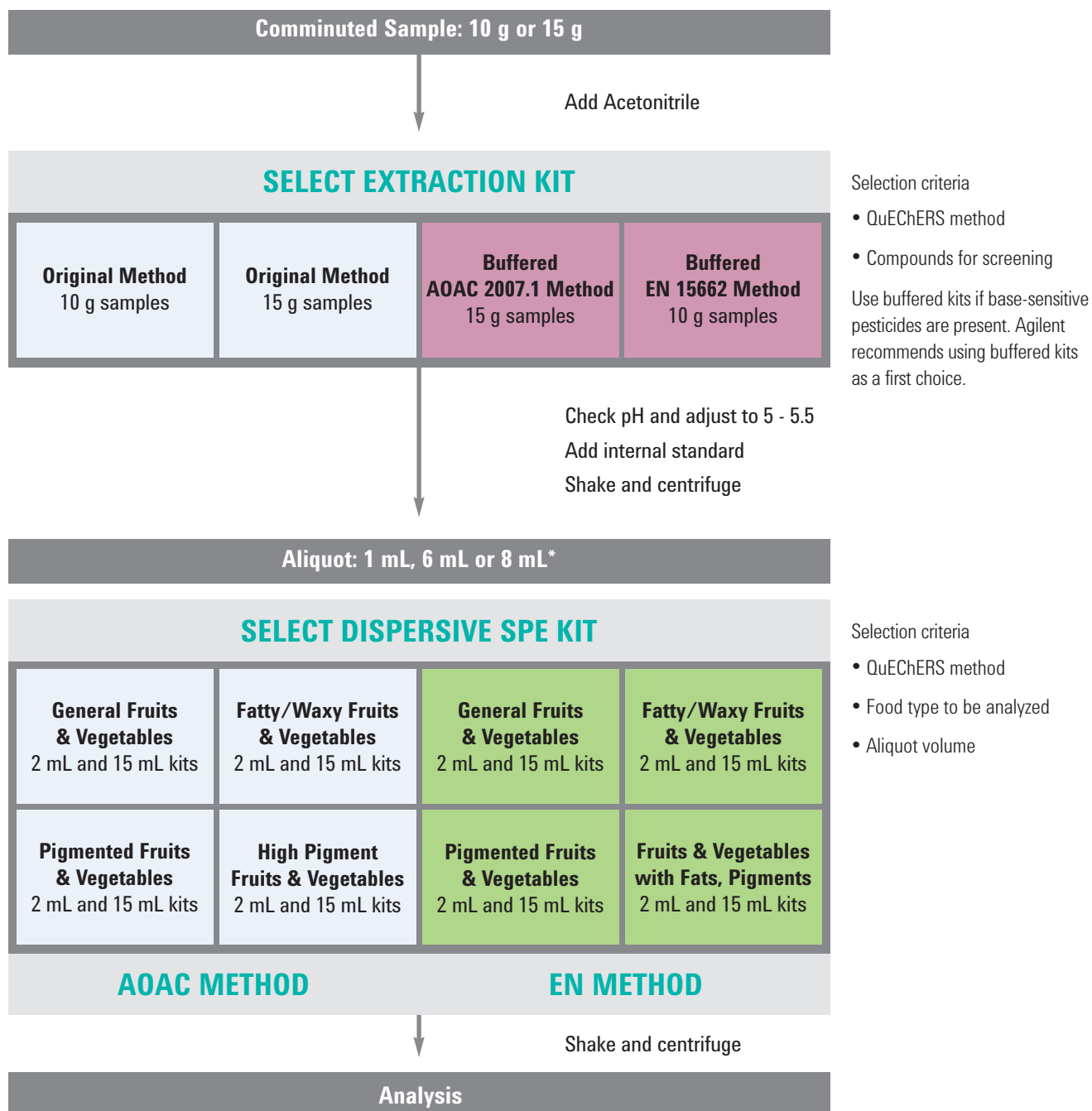
Agilent QuEChERS Kits make sample prep as easy as 1- 2- 3. Pre-packaged Agilent QuEChERS Kits are an easy way to capture the time-saving benefits of QuEChERS sample preparation.

- Extraction kits with pre-weighed anhydrous salts in sealed packets allow you to add salts after you add organic solvent to your sample – avoiding an exothermic reaction that can compromise analyte recovery
- Dispersive kits with sorbents and salts supplied in 2 mL or 15 mL centrifuge tubes accommodate the aliquot volumes specified by current AOAC and EN methodologies
- Universal dispersive kits provide excellent recoveries and reproducibility for all types of fruits and vegetables
- Ceramic homogenizers break up salt agglomerates, promoting consistent sample extraction and increasing product recovery during extraction and dispersion; shaking time reduced from 60 to 20 seconds.



AGILENT RECOMMENDED STANDARD OPERATING PROCEDURE FOR QuEChERS

In just 3 easy steps, you can prepare any fruit or vegetable sample for multi-class, multi-residue pesticide analysis.



*Aliquot size is specified by the method, and kits are created for these specific amounts. For pesticides with acidic groups (phenoxycarboxylic acids), analyze directly by LC/MS/MS at this point (skip the dispersive SPE stage). These acidic groups interact with the PSA that is part of the dispersive SPE step.

QuEChERS EXTRACTION KITS

- Available with or without 50 mL centrifuge tubes and caps
- Include MgSO₄, NaCl, or other salts for buffering; pre-weighed in anhydrous packet

Step 1: Extraction

Adding solvent and salts to a small (10 g or 15 g) comminuted fruit or vegetable sample enables you to extract the pesticides of interest into the organic layer. However, adding a food sample with a high percentage of water directly to the salts may create an exothermic reaction that can affect your analyte recoveries. Choose the extraction salt packet based on your method of analysis, AOAC or EN. The buffered extraction salts are amenable for more liable pesticides.

Agilent pre-packages its QuEChERS salts and buffers in anhydrous packages. This allows you to add them after adding your solvent to the sample, as specified in QuEChERS methodologies.

QuEChERS Extraction Kits

| Method | Buffered | Contents | Ceramic Homogenizers | With Tubes | Packets Only | |
|-------------------------|----------|--|----------------------|-------------|--------------|-----------|
| | | | | | 50/pk | 200/pk |
| AOAC 2007.01 | Yes | 6 g MgSO ₄ ; 1.5 g NaAcetate | Yes | 5982-5755CH | | |
| | | | No | 5982-5755 | 5982-6755 | 5982-7755 |
| Original (10 g samples) | No | 4 g MgSO ₄ ; 1 g NaCl | Yes | 5982-5550CH | | |
| | | | No | 5982-5550 | 5982-6550 | 5982-7550 |
| Original (15 g samples) | No | 6 g MgSO ₄ ; 1.5 g NaCl | Yes | 5982-5555CH | | |
| | | | No | 5982-5555 | 5982-6555 | 5982-7555 |
| EN 15662 | Yes | 4 g MgSO ₄ ; 1 g NaCl; 1 g NaCitate; 0.5 g disodium citrate sesquihydrate | Yes | 5982-5650CH | | |
| | | | No | 5982-5650 | 5982-6650 | 5982-7650 |
| Acrylamides* | No | 4 g MgSO ₄ ; 0.5 g NaCl | No | 5982-5850 | | |

*Katerina Mastovaka and Steven J. Lehotay have done work to extend the scope of QuEChERS beyond fruits and vegetables(1), using it to extract acrylamides in potato chips and other fried foods.

1: "Rapid Sample Preparation Method for LC-MS/MS or GC-MS Analysis of Acrylamides in Various Food Matrices", J. Agric. Food Chem, 2006, 54, 7001-7008.






For more information on QuEChERS, view the video at www.agilent.com/chem/QuEChERSvideo

QuEChERS DISPERSIVE KITS

Step 2: Dispersive SPE Cleanup

Select the Dispersive SPE kit suited to the type of food being analyzed and the method you are following. In this step, an aliquot of the sample extract from Step One is added to a 2 mL or 15 mL centrifuge tube containing a small amount of SPE sorbent and MgSO₄. The sorbent will pull out interfering matrix materials from the sample, while the MgSO₄ helps remove excess water and improve analyte partitioning. Select kits are now available with ceramic homogenizers (2 per tube). Their part numbers are designated by a CH.

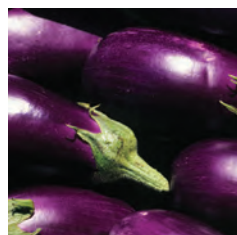
QuEChERS Dispersive Kits

| Kit | Size | Unit | AOAC 2007.01 Method | European Method EN 15662 |
|---|-------|--------|---|--|
| | | | Kit Contents Part No. | Kit Contents Part No. |
|  <p>General fruits and vegetables: Removes polar organic acids, some sugars and lipids</p> | 2 mL | 100/pk | 50 mg PSA 150 mg MgSO ₄ 5982-5022 5982-5022CH | 25 mg PSA 150 mg MgSO ₄ 5982-5021 5982-5021CH |
| | 15 mL | 50/pk | 400 mg PSA 1200 mg MgSO ₄ 5982-5058 5982-5058CH | 150 mg PSA 900 mg MgSO ₄ 5982-5056 5982-5056CH |
|  <p>Fruits and vegetables with fats and waxes: Removes polar organic acids, some sugars, more lipids and sterols</p> | 2 mL | 100/pk | 50 mg PSA 50 mg C18EC 150 mg MgSO ₄ 5982-5122 5982-5122CH | 25 mg PSA 25 mg C18EC 150 mg MgSO ₄ 5982-5121 5982-5121CH |
| | 15 mL | 50/pk | 400 mg PSA 400 mg C18EC 1200 mg MgSO ₄ 5982-5158 5982-5158CH | 150 mg PSA 150 mg C18EC 900 mg MgSO ₄ 5982-5156 5982-5156CH |
|  <p>Pigmented fruits and vegetables: Removes polar organic acids, some sugars and lipids, and carotenoids and chlorophyll; not for use with planar pesticides</p> | 2 mL | 100/pk | 50 mg PSA 50 mg GCB 150 mg MgSO ₄ 5982-5222 5982-5222CH | 25 mg PSA 2.5 mg GCB 150 mg MgSO ₄ 5982-5221 5982-5221CH |
| | 15 mL | 50/pk | 400 mg PSA 400 mg GCB 1200 mg MgSO ₄ 5982-5258 5982-5258CH | 150 mg PSA 15 mg GCB 885 mg MgSO ₄ 5982-5256 5982-5256CH |

Part numbers ending in CH indicate tubes containing ceramic homogenizers.

(Continued)

QuEChERS Dispersive Kits



| Kit | Size | Unit | AOAC 2007.01 Method | European Method EN 15662 |
|--|-------|--------|---|---|
| | | | Kit Contents Part No. | Kit Contents Part No. |
| Highly pigmented fruits and vegetables: Removes polar organic acids, some sugars and lipids, plus high levels of carotenoids and chlorophyll; not for use with planar pesticides | 2 mL | 100/pk | | 25 mg PSA 7.5 mg GCB 150 mg MgSO ₄ 5982-5321 5982-5321CH |
| | 15 mL | 50/pk | | 150 mg PSA 45 mg GCB 855 mg MgSO ₄ 5982-5356 5982-5356CH |
| Fruits and vegetables with pigments and fats: Removes polar organic acids, some sugars and lipids, plus carotenoids and chlorophyll; not for use with planar pesticides | 2 mL | 100/pk | 50 mg PSA 50 mg GCB 150 mg MgSO ₄ 50 mg C18EC 5982-5421 5982-5421CH | |
| | 15 mL | 50/pk | 400 mg PSA 400 mg GCB 1200 mg MgSO ₄ 400 mg C18EC 5982-5456 5982-5456CH | |
| Other Food Methods Removes biological matrix interferences, including hydrophobic substances (fats, lipids) and proteins | 2 mL | 100/pk | 25 mg C18 150 mg MgSO ₄ 5982-4921 5982-4921CH | |
| | 15 mL | 50/pk | 150 mg C18 900 mg MgSO ₄ 5982-4956 5982-4956CH | |
| All Food Types Removes all matrix interfering materials including polar organic acids, lipids, sugars, proteins, carotenoids and chlorophyll | 2 mL | 100/pk | 50 mg PSA 50 mg C18 7.5 mg GCB 150 mg MgSO ₄ 5982-0028 5982-0028CH | |
| | 15 mL | 50/pk | 400mg PSA 400 mg C18 45 mg GCB 1200 MgSO ₄ 5982-0029 5982-0029CH | |

Part numbers ending in CH indicate tubes containing ceramic homogenizers.

QuEChERS Ceramic Homogenizers

Ceramic homogenizers increase your overall lab productivity and give you greater confidence in your results. They make analyte extraction easier by:

- Cutting the required extraction time from 60 seconds to as little as 20 seconds – a time savings of 70% per sample
- Maintaining high, reproducible extractions in a third of the time
- Minimizing variance between technicians
- Breaking up salt agglomerates and maintaining a consistent grinding of homogenizing material
- Increasing your overall lab productivity and having greater confidence in your results

The same great ceramic homogenizers available in our QuEChERS Kits are also available for bulk purchase, providing excellent grinding capabilities of the samples.



QuEChERS Ceramic Homogenizers

| Description | Unit | Part No. |
|-------------------------------------|--------|-----------|
| Ceramic homogenizer for 50 mL tubes | 100/pk | 5982-9313 |
| Ceramic homogenizer for 15 mL tubes | 100/pk | 5982-9312 |
| Ceramic homogenizer for 2 mL tubes | 200/pk | 5982-9311 |



For more information visit the QuEChERS application page at www.agilent.com/chem/QuEChERSapps

Standards for QuEChERS Products

In addition to our industry-leading QuEChERS Kits, Agilent makes your analysis easier by providing standards for the most commonly used regulatory methods, including AOAC and EN.

- Save time and inconvenience of making standards
- Available for both GC and LC instruments
- Ready to use for QuEChERS extractions – no dilutions required

Standards for QuEChERS Products

| Description | Concentration | Kit Contents | Part No. |
|--|-------------------------|--|-----------|
| HPLC & GC Internal Standard, AOAC Method | 1000 µg/mL | Parathion-d10 (diethyl-d10), Alpha-BHC-d6 (alpha-HCH-d6) | 5190-0502 |
| QC Solution, AOAC Method | 500 µg/mL | Triphenyl phosphate | 5190-0503 |
| HPLC Internal Standard, EN Method | 100 µg/mL | Tris (1,3-dichloroisopropyl) phosphate, Nicarbazin | 5190-0500 |
| GC Internal Standard, EN Method | 5000 µg/mL | (2,2',5,5'-tetrachlorobiphenyl), Triphenylmethane, Tris (1,3-dichloroisopropyl) phosphate | 5190-0501 |
| QC Surrogate for GC Standard, EN Method | 500 µg/mL 1000 µg/mL | (2,2',3,4,4',5'-hexachlorobiphenyl) Anthracene-d10 | 5190-0499 |
| GC Standard Mix, EN Method | 100 µg/mL | Malathion, Methyl parathion, Parathion (ethyl), Chlorpyrifos, Fenitrothion, Dichlorvos, Deltamethrin, Chlorpyrifos-methyl, Heptachlor, Bromopropylate, Gamma-HCH, Aldrin, Dieldrin, Disulfoton, Fenvalerate, Procymidone, Hexachlorobenzene, Lamda-cyhalothrin, 4,4'-DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, 4,4'-DDE, 4,4'-DDD, Alpha-BHC, Beta-BHC | 5190-0497 |



For more information on QuEChERS, download the brochure at www.agilent.com/chem/quechersbrochure

LC/MS INSTRUMENTS

Unsurpassed for tough qualitative and quantitative analysis

From best-in-class LC technologies to MS spectral accuracy and precision to TOF-MS systems that let you identify empirical formulas without a spectral library, Agilent LC/MS instruments help you perform discovery, quantitation, and target compound analysis with confidence.

Our powerful data analysis tools and workflow productivity enhancements include:

- Jet Stream technology increases LC/MS and LC/MS/MS sensitivity five-fold by improving the spatial focusing of electrospray droplets
- Maximum ion generation and transmission across a broad mass range ensure low detection limits and quantitation for the widest range of sample types
- Automated method development and optimization: MassHunter Optimizer software automatically finds the best transitions for each compound and determines the optimal fragmentor voltage and collision energies



GC/MS/MS AND GC/MS INSTRUMENTS

High sensitivity and selectivity for dirty samples and demanding environments

Whether your gas phase applications goal is target compound quantitation or the discovery of unknowns, the best way to achieve the critical combination of low detection limits and high-speed measurement is with a system designed specifically for GC/MS/MS applications.

Agilent Triple Quadrupole GC/MS systems are designed from the ground up and include a proprietary solid inert ion source, proven quartz quadrupoles, innovative collision cell design, and triple-axis detector. Together, these features deliver:

- Excellent reliability: a high-temperature, gold-plated quartz quadrupole allows high-boiling components to be boiled away and not deposited on the quadrupoles
- High spectral fidelity without the "cold spots" that can lead to condensation and signal loss
- Flawless GC/MS integration preserves sample integrity during transit
- Complete confidence in your results with data analysis, review, and reporting tools designed specifically for triple quadrupole GC/MS
- Faster analysis: acquisition speeds of up to 500 MRM transitions per second match the front-end performance of the fastest chromatography without compromising data quality





Your tough applications demand Agilent columns and supplies

As the world's chromatography leader, Agilent offers you the widest selection of columns and supplies. All are engineered or selected by our experienced design teams, manufactured to demanding specifications, and tested under strict conditions.

Columns and standards for maximum confidence in your results:

- ZORBAX, Poroshell, Biocolumns for HPLC and UHPLC, Flash Purification, prep columns and media, too
- GPC/SEC columns and standards – including PLgel, PL aquagel-OH, specialty columns and EasiVial standards
- Agilent J&W GC columns – including Ultra Inert, High Efficiency, Select and PorABOND PLOT
- Custom columns for unique applications

Agilent-engineered supplies for peak instrument performance:

- A wide portfolio for GC, LC, MS, and atomic and molecular spectroscopy
- Agilent CrossLab, a portfolio of GC supplies for all major brands of analytical instruments
- MS analyzed vial kits, Ultra Inert inlet liners, and other innovative supplies

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- Contact your local Agilent sales office
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