



## Agilent SampliQ QuEChERS Kits

**Save time and money with a simplified approach to preparing samples for pesticide analysis**

In 2003, USDA scientists developed a groundbreaking method for simplifying the way labs prepare food samples for pesticide analysis. It's called QuEChERS (pronounced "Catchers"), an acronym for the qualities that describe it: **Q**uick, **E**asy, **C**heap, **E**ffective, **R**ugged and **S**afe. With QuEChERS, you can prepare your samples for multi-class, multi-residue pesticide analysis with just a few easy steps.

**See inside** for more information about the method... and the way that Agilent SampliQ makes it easy for you to quickly start using QuEChERS to improve your lab productivity.



Our measure is your success.



# SampliQ QuEChERS Kits make QuEChERS even easier and more reliable

Agilent's SampliQ QuEChERS Kits provide an easy way to take advantage of the simple, time-saving QuEChERS method – because they are pre-packaged to give you greater efficiency and reliability.

Here are some of the ways Agilent SampliQ QuEChERS Kits help you take advantage of all the benefits of the QuEChERS method:

- **No guesswork or measuring**

Pre-packed **extraction kits** and **dispersive SPE kits** are assembled to suit specific food types and screening protocols, so your lab is more productive.

- **Extraction kits are uniquely packaged for optimal results, every time**

Unlike other kits on the market, Agilent SampliQ QuEChERS Extraction Kits package the pre-weighed salts in anhydrous packets. This enables you to add the salts at the appropriate time – *after* you add organic solvent to your sample. Adding

your salts directly to the food sample may cause an exothermic reaction that can compromise your analyte recoveries.

- **It's easy to choose the right Agilent SampliQ QuEChERS Dispersive Kits**

Sorbents and salts for dispersive SPE are supplied in 2 mL or 15 mL centrifuge tubes, for 1 mL, 6 mL or 8 mL aliquot volumes, as specified by the various QuEChERS methodologies in use today. There are different kits to suit the type of food you are analyzing.

- **Agilent Quality**

Agilent's tight quality control ensures that all QuEChERS salts, sorbents and supplies are free of impurities, to yield the most accurate results.

- **World-class technical support**

With Agilent SampliQ QuEChERS Kits, you can count on in-country, in-language technical support.

## A Breakthrough Method

It's not surprising that the QuEChERS method is "catching on" so quickly. After all, it vastly simplifies the sample extraction and cleanup procedure for analyzing pesticide residues in fruits, vegetables and processed products – including cereal and dried fruits. Through a series of simple steps, QuEChERS prepares samples for multi-residue, multi-class pesticide analysis via GC, GC/MS or LC, LC/MS.

The original QuEChERS method is non-buffered, and was developed by M. Anastassiades, S.J. Lehotay, D. Stajnbaher and F.J. Schenck in 2003 and published in the *Journal of AOAC*<sup>1</sup>. Later, refinements were made to ensure efficient extraction of pH dependent compounds, to minimize degradation of

susceptible compounds (e.g. base and acid labile pesticides) and to expand the spectrum of matrices covered.

Today there are two commonly used buffered methods: A European standard (EN 15662)<sup>2,3</sup> available from individual country members of the CEN (visit [www.cen.eu/research](http://www.cen.eu/research)) and a standard recognized by the Association of Analytical Communities (AOAC 2007.01)<sup>4</sup>, used in the US and other countries. Members have access to the method (visit [www.aoac.org](http://www.aoac.org)). Another modification developed by F.J. Schenck uses SPE cartridges in the second part of the process to protect planar and polar pesticides.<sup>5</sup>

### References:

1. M. Anastassiades, S. J. Lehotay, D. Stajnbaher, F.J. Schenck, *Journal of AOAC International (JAOAC)* 86, p. 412-431, **2003**.
2. *QuEChERS: A Mini-Multiresidue Method for the Analysis of Pesticide Residues in Low-fat Products*. [www.quechers.com](http://www.quechers.com), **2009**.
3. EN 15662 Version 2007-10 – 24, *Foods of Plant Origin – Determination of Pesticide Residues Using GC-MS and/or LC-MS/MS Following Acetonitrile Extraction/Partitioning and Clean-up by Dispersive SPE (QuEChERS method)*.

4. AOAC Official Method 2007.01, *Pesticide Residues in Foods by Acetonitrile Extraction and Partitioning with Magnesium Sulfate*.
5. *A rapid multiresidue method for determination of pesticides in fruits and vegetables by using acetonitrile extraction/partitioning and solid-phase extraction column clean-up*. Schenck, F.J., Brown, A.N., Podhorniak, L.V., Parker, A., Reliford, M., and Wong, J.W. *Journal of AOAC International* 91(2):422-38 **2008**



# Take the guesswork and measuring out of the QuEChERS method... with Agilent SampliQ QuEChERS Kits

## STEP ONE: 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.

### The Agilent Difference

Unlike other suppliers of QuEChERS extraction kits, Agilent SampliQ's salts and buffers are pre-packaged in anhydrous packages. This allows you to add them **after** adding your solvent to the sample, as specified in the QuEChERS methodologies.

### Extraction Kits include:

- 50 quantity of 50 mL polypropylene centrifuge tubes with caps
- MgSO<sub>4</sub>, and NaCl, or other salts for buffering; pre-weighed in anhydrous packet (see chart that follows for specific components)



Select the Extraction kit that's appropriate for the method you're following and sample size.






Description	Qty. Per Pack	Tube Size	Tube Content	Part Number
Buffered QuEChERS Extraction Tubes, <b>AOAC Method 2007.01</b> , for use with 15 g samples	50	50 mL	6 g MgSO <sub>4</sub> , 1.5 g NaAcetate	5982-5755
Buffered QuEChERS Extraction Tubes, <b>EN Method 15662</b> , for use with 10 g samples	50	50 mL	4 g MgSO <sub>4</sub> , 1 g NaCl, 1 g NaCitrate, 0.5 g disodium citrate sesquihydrate	5982-5650
Original Quechers Method (non-buffered) Extraction Tubes, for use with 10 g samples	50	50 mL	4 g MgSO <sub>4</sub> , 1 g NaCl	5982-5550
Original QuEChERS Method (non-buffered) Extraction Tubes, for use with 15 g samples	50	50 mL	6 g MgSO <sub>4</sub> , 1.5 g NaCl	5982-5555
QuEChERS Extraction Tubes for <b>Acrylamides*</b>	50	50 mL	4 g MgSO <sub>4</sub> , 0.5 g NaCl	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.

## STEP TWO: Dispersive SPE Clean-Up

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 MgSO<sub>4</sub>. The sorbent will pull out interfering matrix materials from the sample, and the MgSO<sub>4</sub> helps remove excess water and improve analyte partitioning.

Kit	Quantity & Size/Pack	AOAC 2007.01 METHOD	EUROPEAN METHOD – EN 15662
		Contents and Part Number	Contents and Part Number
 <p><b>GENERAL FRUITS AND VEGETABLES:</b> Removes polar organic acids, some sugars and lipids</p>	100 – 2 mL tubes	50 mg PSA 150 mg MgSO <sub>4</sub> <b>Part No. 5982-5022</b>	25 mg PSA 150 mg MgSO <sub>4</sub> <b>Part No. 5982-5021</b>
	50 – 15 mL tubes	400 mg PSA 1200 mg MgSO <sub>4</sub> <b>Part No. 5982-5058</b>	150 mg PSA 900 mg MgSO <sub>4</sub> <b>Part No. 5982-5056</b>
 <p><b>FRUITS AND VEGETABLES WITH FATS AND WAXES:</b> Removes polar organic acids, some sugars, more lipids, and sterols</p>	100 – 2 mL tubes	50 mg PSA 50 mg C18EC 150 mg MgSO <sub>4</sub> <b>Part No. 5982-5122</b>	25 mg PSA 25 mg C18EC 150 mg MgSO <sub>4</sub> <b>Part No. 5982-5121</b>
	50 – 15 mL tubes	400 mg PSA 400 mg C18EC 1200 mg MgSO <sub>4</sub> <b>Part No. 5982-5158</b>	150 mg PSA 150 mg C18EC 900 mg MgSO <sub>4</sub> <b>Part No. 5982-5156</b>
 <p><b>PIGMENTED FRUITS AND VEGETABLES:</b> Removes polar organic acids, some sugars and lipids, and carotinoides and chlorophyll; not for use with planar pesticides.</p>	100 – 2 mL tubes	50 mg PSA 50 mg GCB 150 mg MgSO <sub>4</sub> <b>Part No. 5982-5222</b>	25 mg PSA 2.5 mg GCB 150 mg MgSO <sub>4</sub> <b>Part No. 5982-5221</b>
	50 – 15 mL tubes	400 mg PSA 400 mg GCB 1200 mg MgSO <sub>4</sub> <b>Part No. 5982-5258</b>	150 mg PSA 15 mg GCB 900 mg MgSO <sub>4</sub> <b>Part No. 5982-5256</b>
 <p><b>HIGHLY PIGMENTED FRUITS AND VEGETABLES:</b> Removes polar organic acids, some sugars and lipids, plus high levels of Caratinoides and Chlorophyll; not for use with planar pesticides.</p>	100 – 2 mL tubes		25 mg PSA 7.5 mg GCB 150 mg MgSO <sub>4</sub> <b>Part No. 5982-5321</b>
	50 – 15 mL tubes		150 mg PSA 45 mg GCB 900 mg MgSO <sub>4</sub> <b>Part No. 5982-5356</b>
 <p><b>FRUITS AND VEGETABLES WITH PIGMENTS AND FATS:</b> Removes polar organic acids, some sugars and lipids plus Carotinoides and Chlorophyll; not for use with planar pesticides</p>	100 – 2 mL tubes	50 mg PSA 50 mg GCB 150 mg MgSO <sub>4</sub> 50 mg C18EC <b>Part No. 5982-5421</b>	
	50 – 15 mL tubes	400 mg PSA 400 mg GCB 1200 mg MgSO <sub>4</sub> 400 mg C18EC <b>Part No. 5982-5456</b>	

PSA = Primary Secondary Amine GCB = Graphitized Carbon Black C18 EC = Octadecylsilane, end-capped (Note: For this step, The AOAC method specifies 1 mL or 6 mL aliquot samples; the EN method recommends 1 mL or 8 mL aliquot samples. Kits are assembled based on these specifications.)

# Additional QuEChERS Products

## QuEChERS Bulk Sorbents and Salts

If you prefer to pack your own tubes for QuEChERS, these bulk salts and sorbents provide high-quality materials for that purpose.

Description	Unit	Part Number	Unit	Part Number
Magnesium Sulfate			100 g bottle	5982-8082
Sodium Acetate			100 g bottle	5982-5751
Sodium Chloride			100 g bottle	5982-5750
PSA (Primary Secondary Amine)	25 g bottle	5982-8382	100 g bottle	5982-5753
C18EC	25 g bottle	5982-1382	100 g bottle	5982-5752
Graphitized Carbon Black (GCB)	25 g bottle	5982-4482		
Si-SAX	25 g bottle	5982-2082		

The chart below provides some guidance on the right blend of sorbent, PSA and MgSO<sub>4</sub> you should use for best results with various food matrices. Please refer to your method documentation for more detailed guidance.

Fruit/ Vegetable Characteristic	Examples	Recommended min. mg/mL of extract			
		MgSO <sub>4</sub> *	Sorbent PSA	C18	Graphitized Carbon (GC)
High water content	Lettuce, cucumber, grapes, apples	150 mg	25 mg		
High Lipid Content	Avocado, olives, peanuts, oils	150 mg	25 mg	25 mg	
High chlorophyll, carotenoids content	Spinach, brussels sprouts, artichokes, carrots	150 mg	25 mg		2.5 mg lower pigment; 10 mg higher pigment

\*Removes excess water, induces phase separation

## SPE Cartridges (for Schenck variation of QuEChERS method)

This dual phase SPE cartridge removes high levels of pigments and sterols from extraction solvent. Based on the Schenk method, it allows for the recovery of planar or polar organic pesticides when using a 3:1 acetone: toluene mix.

Description	Unit	Part No.
250 mg Carbon/ 500 mg PSA, 6 mL SPE Cartridge	30 each	5982-4567



## Agilent SampliQ SPE – A full line of sample preparation products to support your lab

The QuEChERS kits discussed in this brochure are part of the Agilent SampliQ family of SPE products. Manufactured in the US to strict ISO-9001 standards – the same process Agilent uses for its world-famous ZORBAX HPLC column packing material – Agilent SampliQ SPE products deliver the high quality and performance you expect from the industry's leading manufacturer of chromatography instruments, columns and supplies. Look to the SampliQ SPE product family for:

- A wide selection of polymer, silica and other sorbents in formats ranging from multiple cartridge sizes to 96-well plates
- Tri-functional silica bonding that provides greater stability than monomeric bonding while increasing solvent compatibility
- Industry-leading quality control processes that ensure consistent particle size, so you get superior flow-through and performance
- A complete range of vacuum manifolds and accessories to help you meet all your SPE challenges

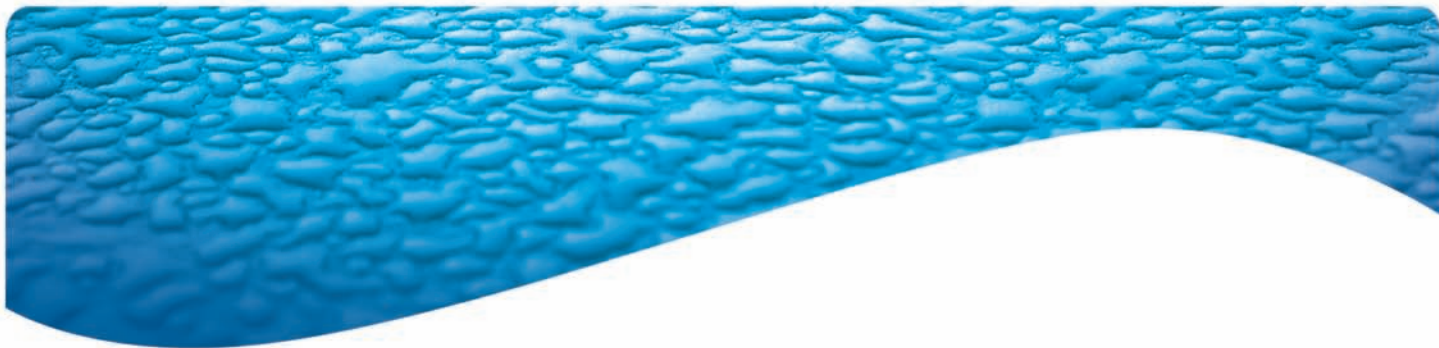
For part numbers and more information about SampliQ, visit [www.agilent.com/chem/SampliQ](http://www.agilent.com/chem/SampliQ)



### Get additional facts about SampliQ and Food Safety Analysis at Solution Source

Solution Source is Agilent's online resource that keeps you up to date on the latest applications, product information, special offers, learning opportunities and upcoming events. Check it out at [www.agilent.com/chem/ssfood](http://www.agilent.com/chem/ssfood)





## Find out how to take your QuEChERS method to the next level

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**A full range of additional supplies – tubes, vial holders, etc. – are also available from Agilent.**

See the *Essential Chromatography and Spectroscopy Catalog* for more details about the full portfolio of Agilent solutions designed to give you ultimate confidence in your chromatography. You can order this catalog and other helpful guides at [www.agilent.com/chem/guides](http://www.agilent.com/chem/guides)

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