

SHIMSEN QuEChERS





A brief overview of the method of QuEChERS-method

- QuEChERS (Quick, Easy, Cheap, Effective, Rugged and Safe) was originally proposed by the US Department of Agriculture as a sample preparation method in 2003.
- It has been applied to a variety of sample preparations, especially for pesticide residue pretreatment.
- It's simpler, more economical, and faster than traditional methods.

Principle of EN 15662

The homogeneous sample is extracted with the help of acetonitrile. Samples with low water content (< 80 %) require the addition of water before the initial extraction to get a total of approximately 10 g of water. After addition of magnesium sulfate, sodium chloride and buffering citrate salts, the mixture is shaken intensively and centrifuged for phase separation. An aliquot of the organic phase is cleaned-up by dispersive solid phase extraction (d-SPE) employing bulk sorbents as well as magnesium sulfate for the removal of residual water.

Following clean-up with amino-sorbents (e.g. primary secondary amin sorbent, PSA) extracts are acidified by adding a small amount of formic acid, to improve the storage stability of certain base-sensitive pesticides. The final extract can be directly employed for GC- and LC-based determinative analysis. Quantification is performed using an internal standard, which is added to the extract after the initial addition of acetonitrile.

Principle of EN 15662

The QuEChERS (quick, easy, cheap, effective, rugged, and safe) method uses a single-step buffered acetonitrile (MeCN) extraction and salting out liquid-liquid partitioning from the water in the sample with MgSO₄. Dispersive-solid-phase extraction (dispersive-SPE) cleanup is done to remove organic acids, excess water, and other components with a combination of primary secondary amine (PSA) sorbent and MgSO₄; then the extracts are analyzed by mass spectrometry (MS) techniques after a chromatographic analytical separation.

The Procedure of QuEChERS-method

AOAC 2007.01 Method

Weigh 15g Homogenized sample, then add 15mL acetonitrile with 1% Acetic acid (V/V) , 6g MgSO₄+1.5g NaOAc+ Internal standards solution.

Shake or Vortex vigorously for 1min, centrifuge > 1500x g, 1min.

Transfer 1mL or 8mL Supernatant to the dSPE Tube depending on the dSPE specification. Shake or Vortex vigorously for 1min, and then centrifuge > 1500x g, 1min.

EN 15662 Method

Weigh 10g Homogenized sample ^①, then add 10mL acetonitrile and internal standards.

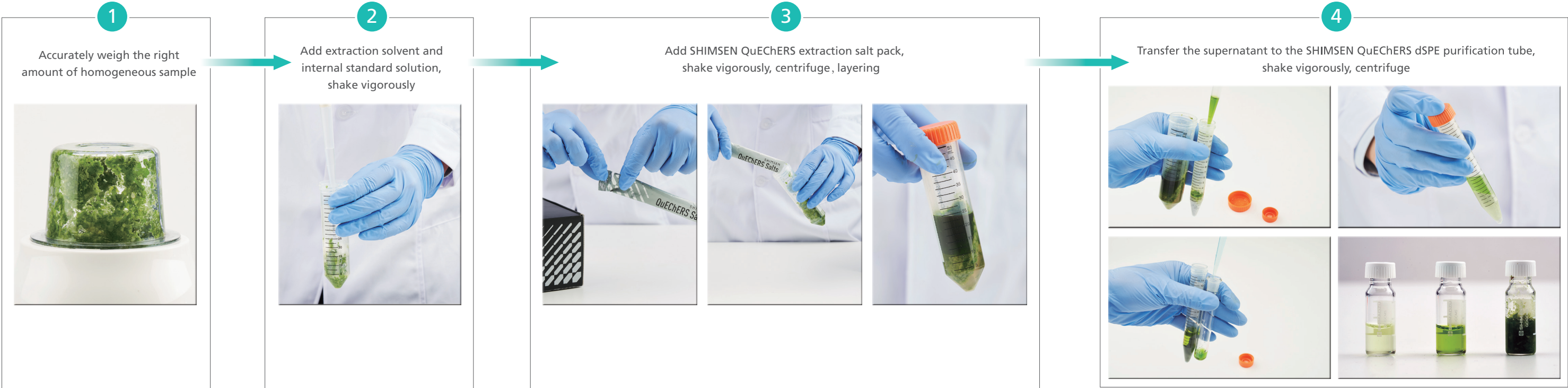
Shake or Vortex vigorously for 1min. (If the sample's water content is < 80%, water must be added after Homogenization, please see the following EN15662:2008 (E) 5.2 ^②)

Add extraction salts (4g MgSO₄, 1g NaCl, 1g TSCD, 0.5g DHS) into the above sample extraction solution. Shake or vortex vigorously for 1min, and then centrifuge > 3000x g, 5min.

Transfer 1mL or 6mL Supernatant to the dSPE Tube depending on the dSPE specification. Shake or Vortex vigorously for 1min, and then centrifuge > 3000x g, 5min.

Dilute, solvent exchange or evaporate as necessary for GC/MS-MS or LC/MS-MS Analysis

1. The sample size depends on the sample matrix: Fruit and vegetable samples, sampled at 10g ± 0.1g; Grain and honey samples, sampled at 5g ± 0.05g; Tea and spices, sampled at 2g ± 0.03g.
2. If the water content of the sample is <80%, a sufficient amount of cold water (<4 °C) needs to be added before the sample is homogenized. The water content of common samples and the amount of water that needs to be added, Please refer to EN15662:2008(E)5.2
3. TSCD - Trisodium citrate dihydrate, DHS - Disodium hydrogen citrate sesquihydrate



Selection guide of d-SPE

AOAC 2007	EN 15662
PN: 380-00990-05 15mL PSA dSPE, 400 mg PSA, 1200 mg MgSO ₄	PN: 380-00990-02 15mL PSA dSPE, 150 mg PSA, 900 mg MgSO ₄
PN: 380-00990-17 2mL PSA dSPE, 50mg PSA, 150mg MgSO ₄	PN:380-00990-21 2mL PSA dSPE, 25mg PSA, 150mg MgSO ₄

AOAC 2007	EN 15662
PN: 380-00990-07 15 mL PSA/C18 dSPE, 400 mg PSA, 400 mg C18, 1200 mg MgSO ₄	PN: 380-00990-06 15 mL PSA/C18 dSPE, 150mg PSA, 150 mg C18, 900 mg MgSO ₄
PN: 380-00990-18 2mL PSA/C18 dSPE, 50mg PSA, 50mg C18,	PN: 380-00990-22 2mL PSA/C18 dSPE, 25mg PSA, 25mg C18,



General Fruits and Vegetables



Pigmented Fruits and Vegetables



AOAC 2007	EN 15662
PN: 380-00990-19 2 mL PSA/GCB dSPE, 50 mg PSA, 50 mg GCB, 150 mg MgSO ₄	PN: 380-00990-04 15 mL PSA/GCB dSPE, 150 mgPSA, 45 mg GCB, 900 mg MgSO ₄
	PN: 380-00990-24 2 mL PSA/GCB dSPE, 25 mgPSA, 7.5 mg GCB, 150 mg MgSO ₄

AOAC 2007
PN: 380-00990-08 15 mL PSA/C18/GCB dSPE, 400 mg PSA, 400 mg GCB, 400 mg C18, 1200 mg MgSO ₄
PN: 380-00990-20 2 mL PSA/C18/GCB dSPE, 50 mg PSA, 50 mg GCB, 50 mg C18, 150 mg MgSO ₄

SHIMSEN QuEChERS

Product List

Products by Method

Poducts for AOAC 2007.01-Method		
Part Number	Product Name	Package
380-00151	Extraction Salts with 50mL Centrifuge Tube, 6g MgSO ₄ , 1.5g NaOAc	50/p
380-00152	Extraction Salts Packets only, 6g MgSO ₄ , 1.5g NaOAc	50/p
380-00990-05	15 mL, 400 mg PSA, 1200 mg MgSO ₄	50/p
380-00990-07	15 mL, 400 mg PSA, 400 mg C18, 1200 mg MgSO ₄	50/p
380-00990-08	15 mL, 400 mg PSA, 400 mg C18, 400 mg GCB, 1200 mg MgSO ₄	50/p
380-00990-17	2 mL, 50 mg PSA, 150 mg MgSO ₄	100/p
380-00990-18	2 mL, 50 mg PSA, 50 mg C18, 150 mg MgSO ₄	100/p
380-00990-19	2 mL, 50 mg PSA, 50 mg GCB, 150 mg MgSO ₄	100/p
380-00990-20	2 mL, 50 mg PSA, 50 mg C18, 50 mg GCB, 150 mg MgSO ₄	100/p

Poducts for EN 15662-Method		
Part Number	Product Name	Package
380-00148	Extraction Salts with 50mL Centrifuge Tube, 4g MgSO ₄ , 1g NaCl, 0.5g DHS, 1g TSCD	50/p
380-00149	Extraction Salts Packets only, 4g MgSO ₄ , 1g NaCl, 0.5g DHS, 1g TSCD	50/p
380-00990-01	15 mL, 150 mg PSA, 15 mg GCB, 900 mg MgSO ₄	50/p
380-00990-02	15 mL, 150 mg PSA, 900 mg MgSO ₄	50/p
380-00990-03	15 mL, 150 mg PSA, 15 mg GCB, 885 mg MgSO ₄	50/p
380-00990-04	15 mL, 150 mg PSA, 45 mg GCB, 900 MgSO ₄	50/p
380-00990-06	15 mL, 150 mg PSA, 150 mg C18, 900 mg MgSO ₄	50/p
380-00990-21	2 mL, 25 mg PSA, 150 mg MgSO ₄	100/p
380-00990-22	2 mL, 25 mg PSA, 25 mg C18, 150 mg MgSO ₄	100/p
380-00990-23	2 mL, 25 mg PSA, 2.5 mg GCB, 150 mg MgSO ₄	100/p
380-00990-24	2 mL, 25 mg PSA, 7.5 mg GCB, 150 mg MgSO ₄	100/p

MgSO₄: Magnesium sulfate, NaOAc: Sodium acetate, NaCl: Sodium chloride, TSCD: Trisodium citrate dihydrate, DHS: Disodium hydrogen citrate sesquihydrate

Supplementary explanation 1:

PSA is mainly used to remove impurities such as sugars, fatty acids, organic acids and anthocyanins in the sample matrix;

C18 is mainly used to remove lipids and non-polar interference substances in the sample matrix;

GCB (graphitized carbon) is mainly used to remove pigments, sterols, non-polar substances;

Supplementary explanation 2:

2mL purification tube is suitable for transferring 1mL extraction solution;

15mL purification tube is suitable for transferring 6-8mL extraction solution;

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Product List

Products by Sample Type

Dispersive-solid-phase extraction (dSPE)									
Sample Type	Example	Method	Contents (mg)				Product Information		
			MgSO ₄	PSA	C18	GCB	Vial Volume (ml)	Pack Size	Part Number
			Removes						
			Excess water	Sugars, fatty acids, organic acids, anthocyanins	Lipids, non-polar interferences	Pigments, sterols, nonpolar substances			
General fruits and vegetables	Celery, head lettuce, cucumber, melon	AOAC 2007.01	150	50	-	-	2	100 pcs	380-00990-17
			1200	400	-	-	15	50 pcs	380-00990-05
		EN 15662	150	25	-	-	2	100 pcs	380-00990-21
			900	150	-	-	15	50 pcs	380-00990-02
Food with fats and waxes	Citrus fruits, cereals, avocado, nuts, seeds, dairy products	AOAC 2007.01	150	50	50	-	2	100 pcs	380-00990-18
			1200	400	400	-	15	50 pcs	380-00990-07
		EN 15662	150	25	25	-	2	100 pcs	380-00990-22
			900	150	150	-	15	50 pcs	380-00990-06
Pigmented fruits and vegetables	Carrot, mango, sweet potatoes, tomatoes	AOAC 2007.01	150	50	-	50	2	100 pcs	380-00990-19
			150	50	50	50	2	100 pcs	380-00990-20
			1200	400	400	400	15	50 pcs	380-00990-08
		EN 15662	150	25	-	2.5	2	100 pcs	380-00990-23
			885	150	-	15	15	50 pcs	380-00990-03
			900	150	-	15	15	50 pcs	380-00990-01
Highly pigmented fruits and vegetables	Red peppers, spinach, chive, lamb's lettuce, spinach, blueberries	EN 15662	150	25	-	7.5	2	100 pcs	380-00990-24
			900	150	-	45	15	50 pcs	380-00990-04
General Purpose	Wide range of commodities, including fatty and pigmented fruits and vegetables	-	150	50	50	7.5	2	100 pcs	380-00990-26

MgSO₄: Magnesium sulfate, PSA: Primary secondary amine sorbent, GCB: Graphitized carbon black