

Sample Preparation Series Product

# SHIMSEN QuEChERS Product Guidebook

**CoreFocus**





# 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 AOAC 2007.01

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  $\text{MgSO}_4$ . 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  $\text{MgSO}_4$ ; 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 MgSO<sub>4</sub>+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 <sup>①</sup>,  
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 <sup>②</sup>)

Add extraction salts (4g MgSO<sub>4</sub>, 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-sodium citrate, DHS-disodium hydrogen citrate

## According to EN 15662: 2008

1

Accurately weigh the right amount of homogeneous sample



2

Add extraction solvent and internal standard solution, shake vigorously



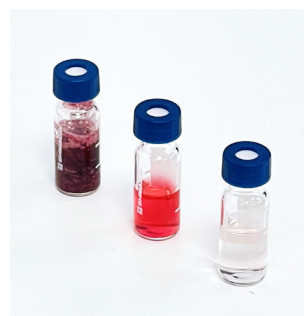
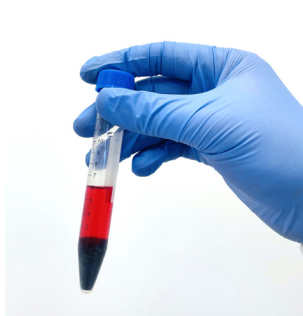
3

Add SHIMSEN QuEChERS extraction salt pack, shake vigorously, centrifuge, Layering



4

Transfer the supernatant to the SHIMSEN QuEChERS dSPE purification tube, shake vigorously, centrifuge





# Selection guide of d-SPE



General Fruits and Vegetables



Fruit/Vegetables with  
Fats and Waxes



Pigmented Fruits and Vegetables

## AOAC 2007

PN: 380-00990-53  
15mL PSA dSPE, 400 mg PSA,  
1200 mg MgSO<sub>4</sub>

PN: 380-00102  
2mL PSA dSPE, 50mg PSA,  
150mg MgSO<sub>4</sub>

## EN 15662

PN: 380-00990-35  
15mL PSA dSPE, 150 mg PSA,  
900 mg MgSO<sub>4</sub>

PN: 380-00101  
2mL PSA dSPE, 25mg PSA,  
150mg MgSO<sub>4</sub>

## GB23200.113

PN: 380-00149-04  
Ext-Salts, 4g MgSO<sub>4</sub>, 1g NaCl,  
0.5g DHS, 1g TSCD

PN: 380-00990-35  
15mL dSPE, 150mg PSA,  
900mg MgSO<sub>4</sub>

## GB23200.121

PN: 380-00149-04  
Ext-Salts, 4g MgSO<sub>4</sub>, 1g NaCl,  
0.5g DHS, 1g TSCD

PN: 380-00990-42  
15mL dSPE, 30mg PSA,  
900mg MgSO<sub>4</sub>

## AOAC 2007

PN: 380-00990-38  
15mL PSA/C18 dSPE, 400mg PSA,  
400mg C18, 1200 mg MgSO<sub>4</sub>

PN: 380-00104  
2mL PSA/C18 dSPE, 50mg PSA,  
50mg C18, 150mg MgSO<sub>4</sub>

## EN 15662

PN: 380-00990-49  
15mL PSA/C18 dSPE, 150mg PSA,  
150mg C18, 900mg MgSO<sub>4</sub>

PN: 380-00103  
2mL PSA/C18 dSPE, 25mg PSA,  
25mg C18, 150mg MgSO<sub>4</sub>

## GB23200.113

PN: 380-00152-04  
Ext-Salts, 6g MgSO<sub>4</sub>, 1.5g  
NaOAc

PN: 380-00990-38  
15mL dSPE, 400mg C18,  
400mg PSA, 1200mg MgSO<sub>4</sub>

## GB23200.121

PN: 380-00152-04  
Ext-Salts, 6g MgSO<sub>4</sub>, 1.5g  
NaOAc

PN: 380-00990-47  
15mL dSPE, 80mg PSA,  
400mg C18, 1200mg MgSO<sub>4</sub>

## AOAC 2007

PN: 380-00105  
2mL PSA/GCB dSPE, 50mg PSA,  
50mg GCB, 150mg MgSO<sub>4</sub>

## EN 15662

PN: 380-00990-52  
15mL PSA/GCB dSPE, 150mg PSA,  
15mg GCB, 900mg MgSO<sub>4</sub>

PN: 380-00158  
2mL PSA/GCB dSPE, 25mg PSA,  
2.5mg GCB, 150mg MgSO<sub>4</sub>

PN: 380-00990-45  
15mL PSA/GCB dSPE, 150mg PSA,  
45mg GCB, 900mg MgSO<sub>4</sub>

PN: 380-00159  
2mL PSA/GCB dSPE, 25mg PSA,  
7.5mg GCB, 150mg MgSO<sub>4</sub>

## GB23200.113

PN: 380-00149-04  
Ext-Salts, 4g MgSO<sub>4</sub>, 1g NaCl,  
0.5g DHS, 1g TSCD

PN: 380-00990-34  
15mL dSPE, 150mg PSA,  
15mg GCB, 885mg MgSO<sub>4</sub>

## GB23200.121

PN: 380-00149-04  
Ext-Salts, 4g MgSO<sub>4</sub>, 1g NaCl,  
0.5g DHS, 1g TSCD

PN: 380-00990-40  
15mL dSPE, 30mg PSA,  
15mg GCB, 900mg MgSO<sub>4</sub>

# SHIMSEN QuEChERS Product List

## Products for GB 23200.113-2018

Code Number	Product Name	package
380-00148-04	Ext-Salts with 50mL Tube, 4g MgSO <sub>4</sub> , 1g NaCl, 0.5g DHS, 1g TSCD	50/P
380-00149-04	Ext-Salts, 4g MgSO <sub>4</sub> , 1g NaCl, 0.5g DHS, 1g TSCD	50/P
380-00151-04	Ext-Salts with 50mL Tube, 6g MgSO <sub>4</sub> , 1.5g NaOAC	50/P
380-00152-04	Ext-Salts, 6g MgSO <sub>4</sub> , 1.5g NaOAc	50/P
380-00990-35	15mL PSA dSPE, 150mg PSA, 900mgMgSO <sub>4</sub>	50/p
380-00990-34	15mL PSA/GCB dSPE, 150mg PSA, 15mg GCB, 885mg MgSO <sub>4</sub>	50/p
380-00990-38	15mL PSA/C18 dSPE, 400mg PSA, 400mg C18, 1200mgMgSO <sub>4</sub>	50/p
380-00990-37	15mL PSA/C18/GCB dSPE, 400mg PSA, 400mg C18, 200mg GCB, 1200mg MgSO <sub>4</sub>	50/p
380-00990-52	SHIMSEN QuEChERS III, 15mL, 150mg PSA, 15mg GCB, 900mg MgSO <sub>4</sub>	50/p

## Products for GB 23200.121-2021

Code Number	Product Name	package
380-00148-04	Ext-Salts with 50mL Tube, 4g MgSO <sub>4</sub> , 1g NaCl, 0.5g DHS, 1g TSCD	50/P
380-00149-04	Ext-Salts, 4g MgSO <sub>4</sub> , 1g NaCl, 0.5g DHS, 1g TSCD	50/P
380-00151-04	Ext-Salts with 50mL Tube, 6g MgSO <sub>4</sub> , 1.5g NaOAC	50/P
380-00152-04	Ext-Salts, 6g MgSO <sub>4</sub> , 1.5g NaOAc	50/P
380-00990-42	15mL PSA dSPE, 30mg PSA, 900mg MgSO <sub>4</sub>	50/P
380-00990-40	15mL PSA dSPE, 30mg PSA, 15mg GCB, 900mg MgSO <sub>4</sub>	50/P
380-00990-47	15mL PSA dSPE, 80mg PSA, 400mg C18, 1200mg MgSO <sub>4</sub>	50/P
380-00990-37	15mL PSA dSPE, 400mg C18, 400mg PSA, 200mg GCB, 1200mg MgSO <sub>4</sub>	50/P
380-00990-41	15mL PSA dSPE, 30mg PSA, 300mg C18, 900mg MgSO <sub>4</sub>	50/P

## Products for AOAC 2007.01-Method

Code Number	Product Name	package
380-00151-04	Ext-Salts with 50mL Tube, 6g MgSO <sub>4</sub> , 1.5g NaOAC	50/p
380-00152-04	Ext-Salts, 6g MgSO <sub>4</sub> , 1.5g NaOAc	50/p
380-00102	2mL PSA dSPE, 50mg PSA, 150mg MgSO <sub>4</sub>	100/p
380-00990-53	15mL PSA dSPE, 400mg PSA, 1200mg MgSO <sub>4</sub>	50/p
380-00104	2mL PSA/C18 dSPE, 50mg PSA, 50mg C18, 150mg MgSO <sub>4</sub>	100/p
380-00990-38	15mL PSA/C18 dSPE, 400mg PSA, 400mg C18, 1200mg MgSO <sub>4</sub>	50/p
380-00105	2mL PSA/GCB dSPE, 50mg PSA, 50mgGCB, 150mg MgSO <sub>4</sub>	100/p
380-00130	2mL PSA/C18/GCB dSPE, 50mg PSA, 50mg C18, 50mg GCB, 150mg MgSO <sub>4</sub>	100/p
380-00990-60	15mL PSA/C18/GCB dSPE, 400mg PSA, 400mg C18, 400mg GCB, 1200mg MgSO <sub>4</sub>	50/p
380-00990-37	15mL PSA/C18/GCB dSPE, 400mg PSA, 400mg C18, 200mg GCB, 1200mg MgSO <sub>4</sub>	50/p

## Products for EN 15662-Method

Code Number	Product Name	package
380-00148-04	Ext-Salts with 50mL Tube, 4g MgSO <sub>4</sub> , 1g NaCl, 0.5g DHS, 1g TSCD	50/p
380-00149-04	Ext-Salts, 4g MgSO <sub>4</sub> , 1g NaCl, 0.5g DHS, 1g TSCD	50/p
380-00101	2mL PSA dSPE, 25mg PSA, 150mg MgSO <sub>4</sub>	100/p
380-00990-52	15mL PSA/GCB dSPE, 150mg PSA, 15mg GCB, 900mg MgSO <sub>4</sub>	50/p
380-00990-35	15mL PSA dSPE, 150mg PSA, 900mg MgSO <sub>4</sub>	50/p
380-00103	2mL PSA/C18 dSPE, 25mg PSA, 25mg C18, 150mg MgSO <sub>4</sub>	100/p
380-00990-49	15mL PSA/C18 dSPE, 150mg PSA, 150mg C18, 900mg MgSO <sub>4</sub>	50/p
380-00158	2mL PSA/GCB dSPE, 25mg PSA, 2.5mg GCB, 150mg MgSO <sub>4</sub>	100/p
380-00990-34	15mL PSA/GCB dSPE, 150mg PSA, 15mg GCB, 885mg MgSO <sub>4</sub>	50/p
380-00990-45	15mL PSA/GCB dSPE, 150mg PSA, 45mg GCB, 900mg MgSO <sub>4</sub>	50/p
380-00159	2mL PSA/GCB dSPE, 25mg PSA, 7.5mg GCB, 150mg MgSO <sub>4</sub>	100/p

## Ceramic homogenizer & Centrifuge tube

Code Number	Product Name	package
380-00169	Ceramic homogenizer, Compatible with 2 mL dSPE purification tube	100/p
380-00170	Ceramic homogenizer, Compatible with 15 mL dSPE purification tube	100/p
380-00171	Ceramic homogenizer, Compatible with 50 mL extraction tube	100/p
380-00163-05	SHIMSEN QuEChERS III, 15mL, PP Centrifuge Tube	50/p
380-00163-06	SHIMSEN QuEChERS III, 50mL, PP Centrifuge Tube	50/p

### 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 (carbon black) 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;

### Supplementary explanation 3:

Functions of Ceramic homogenizer

1. Excess anhydrous MgSO<sub>4</sub> needs to be added during the extraction and purification process. The ceramic protons can effectively prevent excessive salt agglomeration.

2. During oscillation and centrifugation, the ceramic homogenizer accelerates the diffusion of the adsorbent for better extraction of the purified sample

# SHIMSEN QuEChERS Product List

Dispersive- solid: phase extraction (dSPE)									
Sample Type	Example	Method	Contents (mg)				Product Information		
			MgSO <sub>4</sub>	PSA	C18	GCB	Vial Volume (ml)	Pack Size	Part Number
			Removes						
			Excess water	Sugars, ftty acids, organic acids, anthocanins	Upids 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	380-00990-53
		EN 15662	150	25	/	/	2	100 pcs	380-00990-21
			900	150	/	/	15	50 pcs	380-00990-35
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	380-00990-38
		EN 15662	150	25	25	/	2	100 pcs	380-00990-22
			900	150	150	/	15	50 pcs	380-00990-49
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	380-00990-60
		EN 15662	150	25	/	2.5	2	100 pcs	380-00990-23
			885	150	/	15	15	50 pcs	380-00990-34
			900	150	/	15	15	50 pcs	380-00990-52
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	380-00990-45
General Purpose	Wide range of commodities, including fatty and pigmented fruits and vegetables	/	150	50	50	7.5	2	100 pcs	380-00990-26

MgSO<sub>4</sub> Magnesium sulfate, PSA: Primary secondary amine sorbent, GCB: Carbon black.

If you require products with other specifications or components, please consult with SGLC for customization options.



**Shimadzu (Shanghai) Global Laboratory Consumables Co., Ltd.**  
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