



1. Introduction

QuEChERS (Quick, Easy, Cheap, Effective, Rugged and Safe), is a fast sample preparation method for multiresidue, multiclass pesticide analysis.

2. Principle

The principle of QuEChERS is similar with that of HPLC and SPE. They all use the interaction between adsorbent and impurities from matrix and adsorb impurities with packing materials to remove impurities and purify the target.

3. Advantages

- High reproducibility. The recovery rate for lots of pesticide products with polarity and volatility is more than 85%.
- Excellent accuracy. The inner standard method can be used for correction.
- Various analytical range of pesticide. Both of the polar and nonpolar pesticide products can get a good reproducibility with this technique.
- Fast to prepare. 6 samples can be prepared in 30 min.
- Small usage amount of solvent, low pollution and cost, not using the solvent containing chloride.
- Simple operations without good training and high skills.
- Seal the container as soon as adding acetonitrile to reduce its contact with staff.
- Simple devices. Few glass wares are used in the process of sample preparation.

4. Operation Steps

The steps of QuEChERS are as follows. (1) chop and grind the sample, then extract the components of target with acetonitrile and QuEChERS extraction kit; (2) put in the clean up tube with sorbents to remove and adsorb impurities, then take the supernatant to test.

Step 1: Extraction

Put the acetonitrile and QuEChERS extraction kits in few fruits and vegetables (10g or 15g) after homogenization, then absorb supernatant for purification after homogenization, ultrasonic extraction and centrifugation.

Note: if salt is added directly in the food with high moisture, exothermic reaction may be caused so that the recovery of analyte would be influenced.

Step 2: Purify with Dispersive SPE Column

According to the types of analyzed food and the method, the proper dispersive SPE clean up tube is chosen. In this step, equal amounts of the extracted sample reagent in step 1, are added in the 2ml or 15 ml clean up tubes, fully shake and mixed. The supernatant are concentrated or directly injected after centrifugation. (There are few adsorbents and $MgSO_4$ in the centrifuge tube. The adsorbent can remove the interfering substances in sample. $MgSO_4$ can remove spare moisture and improve the distribution of sample).

5. Example:

Detection of Multi-pesticide in Apples by Welchrom® QuEChERS (make the preparation for other products referring to this preparation steps)

• Extraction

- 1) Put 15g homogenized apple sample in the centrifuge tube (moisture>80%).
- 2) Add 15mL acetonitrile containing 1% acetic acid.
- 3) Add internal standard solution.
- 4) Vortex for 1 min.
- 5) Put salt kits in the centrifuge tube.
- 6) Shake vigorously immediately for 1 min.
- 7) Centrifuge under 4000 rpm for 5 min.
- 8) Absorb supernatant for purification.

• Clean up

- 1) For 1ml supernatant, use 2ml clean up tube.
- 2) For 8ml supernatant, use 15ml clean up tube.
- 3) Put the supernatant in the centrifugal tube and shake vigorously for 1 min.
- 4) Centrifuge under 13000 rpm for 2 min.
- 5) Take the supernatant in the sampler vial for analysis.



Welchrom® QuEChERS

Welchrom® QuEChERS Extraction Kits (without 50ml tubes)

Methods	Components	Pack Size	Part Number
AOAC 2007.01	6g MgSO ₄ , 1.5g NaAC	50	00528-20000
EN 15662	4 g MgSO ₄ , 1 g NaCl, 1 g NaCitate, 0.5 g disodium citrate sesquihydrate	50	00529-20000
Original	4 g MgSO ₄ , 1 g NaCl	50	00530-20000

Welchrom® QuEChERS Clean-up Tubes

	Methods	Tubes /ml	Pack Size	MgSO ₄ /mg	PSA /mg	C18E /mg	GCB /mg	Part Number
General fruits and vegetables	AOAC	2	100	150	50			00531-20020
	2007.01	15	50	1200	400			00531-20021
	EN 15662	2	100	150	25			00532-20020
		15	50	900	150			00532-20021
Waxy or fatty fruits and vegetables	AOAC	2	100	150	50	50		00533-20020
	2007.01	15	50	1200	400	400		00533-20021
	EN 15662	2	100	150	25	2		00534-20020
		15	50	900	150	150		00534-20021
Pigment content fruits and vegetables	AOAC	2	100	150	50		50	00535-20020
	2007.01	15	50	120	400		400	00535-20021
	EN 15662	2	100	150	25		2.5	00536-20020
		15	50	900	150		15	00536-20021
Highly pigmented and fatty fruits and vegetables	AOAC	2	100	150	50		50	00537-20020
	2007.01	15	50	1200	400		400	00537-20021
Highly pigmented fruits and vegetables	EN 15662	2	100	150	25		2.5	00537-20020
		15	50	900	150		15	00537-20021

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