



ChloroFiltr[®]: A Novel Sorbent for Chlorophyll Removal using QuEChERS

UCT Part Numbers:

ECPAHFR50CT (50 mL polypropylene centrifuge tube)

ECQUUS2-MP (Mylar pouch with 4000 mg MgSO₄ and 2000 mg NaCl)

CUMPSGGC182CT (2 mL centrifuge tube with 150 mg MgSO₄, 50 mg PSA, 50 mg C18 and 50 mg ChloroFiltr[®])

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Spinach and other highly pigmented vegetables contain chlorophylls, carotenoids, xanthophylls, and anthocyanins. Chlorophylls have the greatest adverse effect on GC systems due to their non-volatile characteristics. This QuEChERS procedure uses ChloroFiltr[®] to significantly reduce chlorophylls without sacrificing the recoveries of planar pesticides.

Procedure

1. QuEChERS Extraction

- a) Homogenize 500 g of spinach in a food processor for 1-2 minutes
- b) Weigh 10 grams of homogenized spinach sample into 50 mL centrifuge tube
- c) Spike with 100 μ L of 50 ppm triphenyl phosphate* as internal standard (IS)
- d) Add 10 mL of acetonitrile then shake for 1 min
- e) Add contents of Mylar pouch **ECQUUS2-MP** then shake vigorously for 1 min
- f) Centrifuge at 5,000 rpm for 5 min
- g) Supernatant is ready for clean-up

*50 ppm TPP solution: mix 50 μ L of 5000 ppm TPP solution with 4.95 mL of MeCN

2. dSPE Clean-up

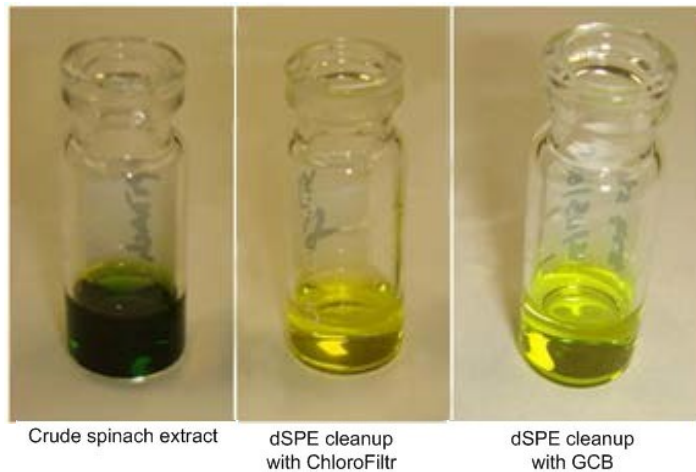
- a) Transfer 1 mL of the extract to the 2 mL **CUMPSGGC182CT** (ChloroFiltr) dSPE micro centrifuge tube
- b) Shake for 30 sec
- c) Centrifuge at 3,000 rpm for 5 min
- d) Transfer 0.4 mL of the supernatant to a 2 mL autosampler vial
- e) Sample is ready for LC/MS/MS analysis

MS Parameters	
MS instrument	Thermo TSQ Vantage triple
Polarity	ESI +
Spray Voltage	3000 V
Vaporizer Temperature	350 °C
Ion Transfer Capillary	300 °C
Sheath Gas Pressure	40 arbitrary units
Auxiliary Gas Pressure	10 arbitrary units
Q1 and Q3 Peak Width	0.7 Da
Collision Gas and Pressure	Argon at 1.5 mTorr

HPLC Conditions	
HPLC system	Thermo Accela 1250 LC equipped with PAL auto-sampler
LC Column	Sepax HP-C18, 2.1*100 mm, 3 µm
Guard column	Restek C18, 2.1*20 mm, 3 µm
Column temperature	ambient
Auto-sampler Temp.	15 °C
Injection volume	10 µL
Mobile phase A	0.1% formic acid in Milli-Q water
Mobile phase B	0.1% formic acid in methanol
Flow rate	200 µL/min

Gradient Program		
Time (min)	Mobile phase A	Mobile phase B
0	95	5
1	95	5
3	50	50
8	5	95
14	5	95
14.2	95	5
16	95	5

SRM Transitions							
Compound	Precursor ion	Product ion 1	CE 1	Product ion 2	CE 2	S-Lens	Dwell time
Carbendazim	192.093	132.080	29	160.080	17	81	0.10
Thiabendazole	202.059	131.060	31	175.070	31	103	0.10
Pyrimethanil	200.116	107.060	23	183.140	22	66	0.10
Cyprodinil	226.122	77.030	40	93.050	33	88	0.10
TPP (IS)	327.093	77.020	37	152.070	33	98	0.10
Diazinon	305.135	153.090	15	169.08	14	89	0.10
Pyrazophos	374.103	194.060	20	222.130	20	104	0.10
Chlorpyrifos	349.989	96.890	32	197.940	17	69	0.10



Extract cleaned with ChloroFiltr[®] (Middle) is less green than that cleaned with GCB (Right), indicating that ChloroFiltr[®] is slightly more efficient in Chlorophyll removal.

Comparison of Pesticide Recoveries and RSDs Obtained by dSPE Clean-up of Spinach Sample using ChloroFiltr [®] and GCB (n=4)				
Pesticide	ChloroFiltr [®]		GCB (7.5 mg)	
	Recovery%	RSD%	Recovery%	RSD%
Carbendazim	87.1	1.0	71.2	4.0
Thiabendazole	93.2	1.9	55.9	2.6
Pyrimethanil	97.3	1.2	85.0	1.2
Cyprodinil	91.2	0.5	79.3	3.1
Diazinon	104.5	2.3	100.0	0.6
Pyrazophos	92.0	0.9	92.7	1.6
Chlorpyrifos	95.6	2.5	96.3	2.1