Agilent Enhanced Matrix Removal—Lipid

LOSE THE LIPIDS,
FIND YOUR ANALYTES

The Measure of Confidence

Bond Elut

Agilent Technologies

ARE LIPIDS WEIGHING YOUR SAMPLES DOWN?

Interference from lipids is a problem for labs measuring trace residues in fatty foods or complex biological matrices. Lipids can build up in the instrument and column, decreasing lifetime and reducing analyte sensitivity due to ion suppression. The need for MS maintenance increases too, because of lipid deposits on the source. The need for lipid removal is well understood, but current methods often sacrifice analyte recovery, removing some of your target analytes along with the lipids.

Now, you don't have to choose between lipid removal and analyte recovery, because innovative **Agilent Enhanced Matrix Removal—Lipid** delivers the most complete matrix removal and analyte recovery of any sample prep product.

Enhanced Matrix Removal—Lipid, UNLIKE any other type of sample prep, is a unique sorbent that selectively removes lipids in complex matrices and challenging high-fat samples such as avocado, so you can remove lipids without losing your analytes.
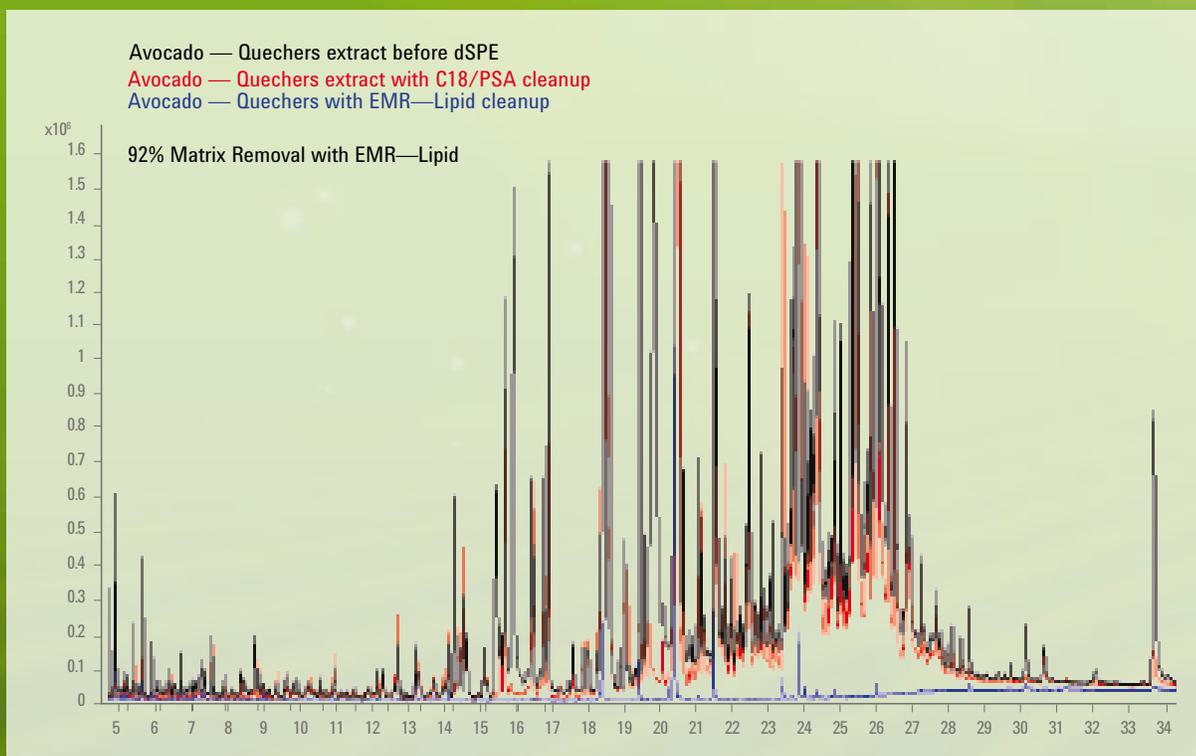

Figure 1. GC/MS full-scan chromatogram overlay of an untreated QuEChERS avocado extract (black), compared to traditional C18/PSA cleanup (red) and an extract treated with Agilent Enhanced Matrix Removal—Lipid (blue).

STANDARD QuEChERS

Extraction/partition (6 steps)

▼

Mix and centrifuge

▼

Transfer to dSPE (sorbents)

▼

Mix and centrifuge

▼

Evaporate/reconstitute or dilute

▼

Filter out precipitate

▼

Transfer to A/S vial

EMR—LIPID QuEChERS

Extraction/partition (6 steps)

▼

Mix and centrifuge

▼

Transfer to dSPE (EMR—Lipid & H2O)

▼

Mix and centrifuge

▼

Polish*

▼

Evaporate/reconstitute or dilute

▼

Transfer to A/S vial

*Note: Polish step is omitted for tetracycline analysis.

The innovative sorbent in EMR—Lipid replaces C18/PSA in your QuEChERS methodology to significantly reduce matrix effects and improve analyte recoveries. It can be universally applied to the analysis of polar, mid-polar and non-polar target analytes, providing effective matrix removal.
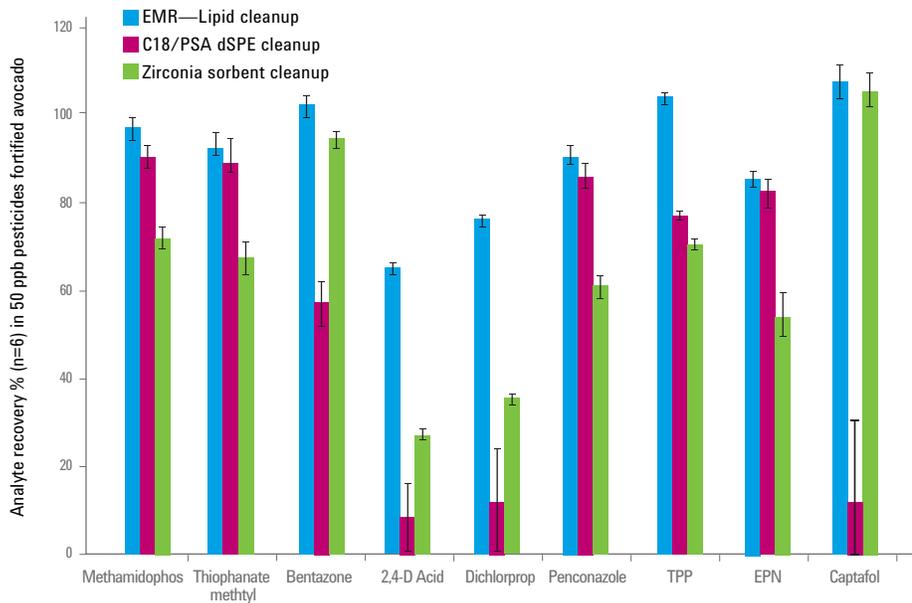
| Sample Type	Removal (%)
Avocado	92
Olive oil	73
Avocado oil	82
Canola oil	75
Beef liver	97
Wet cat food	91
Paprika	91
Cumin	72
Hops	57
Tumeric	47
Black pepper	22
Onion	41
Strawberry	10
Plum	12
Red pepper	61
Spinach	61
Orange	52
Apple	66

EMR—LIPID
MINIMIZE LIPIDS. MAXIMIZE RESULTS.

EMR—Lipid significantly removes matrix contributions, improving recovery across many analytes and minimizing your need for separate workup and methods.

Figure 3. Recovery data for multiple pesticide residue analysis in avocado, showing some of the 73 pesticides analyzed. Using Agilent Enhanced Matrix Removal— Lipid, 92% of the pesticides fell within the acceptable recovery range of 70 to 120%.
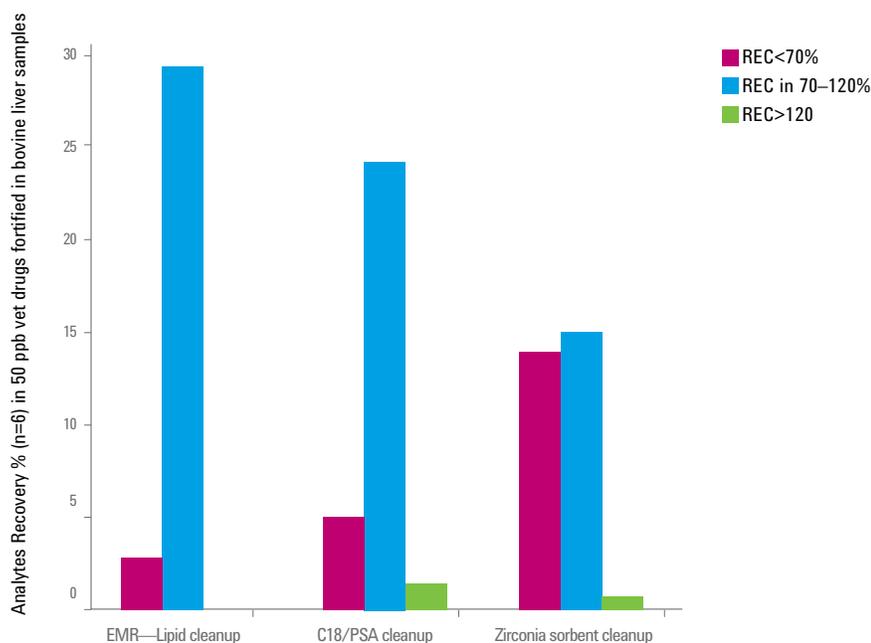
Higher efficiency matrix removal with EMR—Lipid results in higher precision and greater accuracy in results.

Figure 4. Number of analytes with % recoveries within the acceptable % recovery range of 70-120% for the analysis of vet drugs in Bovine Liver, demonstrating the higher number of acceptable results after Agilent Enhanced Matrix Removal—Lipid Cleanup vs zirconia sorbent.

Chromatographic benefits of sample preparation using EMR—Lipid QuEChERS

Efficiently removing lipids from samples without removing analytes is the key to improving chromatographic performance for the best quality data, especially with high-sensitivity MS detectors.

An EMR—Lipid QuEChERS protocol considerably improves accuracy, reproducibility, and low-level quantitation when using GC/MS and LC/MS (Figure 5).

BENEFIT	BETTER ANALYTE SENSITIVITY	IMPROVED S/N RATIO	LESS INTERFERENCES FOR ACCURATE INTEGRATION
Example	EPN in avocado on LC-QQQ	Captan in avocado on GC-QQQ	Permethrin in avocado on GC-QQQ
EMR—Lipid cleanup			
Zirconia sorbent cleanup			
C18/PSA cleanup			

Figure 5. Improvements in chromatography can be seen in the analysis of samples prepared with Agilent Enhanced Matrix Removal—Lipid, including better sensitivity due to reduced matrix ion suppression, better signal-to-noise ratio, and fewer interferences providing accurate integration with GC or LC triple quadrupole systems.

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FASTER SAMPLE PREP STREAMLINES LAB PRODUCTIVITY

Without effective sample cleanup, analytical efficiency and quality are quickly compromised as fatty matrices build up in the instrument and column. With EMR—Lipid, system performance is maintained even after 100 injections of a fatty-matrix sample like avocado. Reduced maintenance allows for increased sample throughput and enables you to use your assets to their fullest extent, maximizing productivity in your lab.
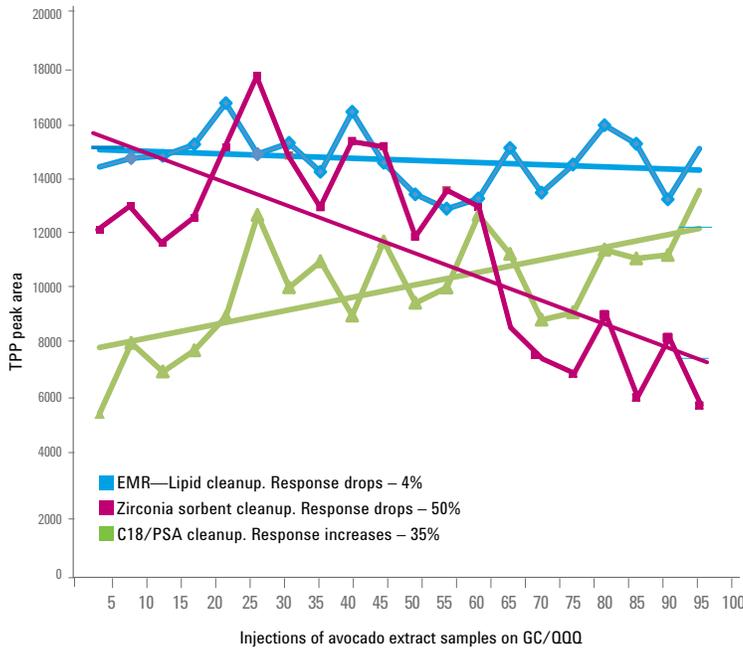

Figure 6. Analyte response across 100 avocado sample injections. Triphenyl phosphate (TPP) is a commonly used internal standard. Signal suppression or enhancement can result from insufficient cleanup of samples, which can contribute to poor data quality, errors, and re-running samples. The superior matrix removal ability of Agilent Enhanced Matrix Removal—Lipid, results in a cleaner source and more consistent MS response over time, for higher quality data, fewer re-runs, and reduced need for time-consuming troubleshooting and source maintenance.
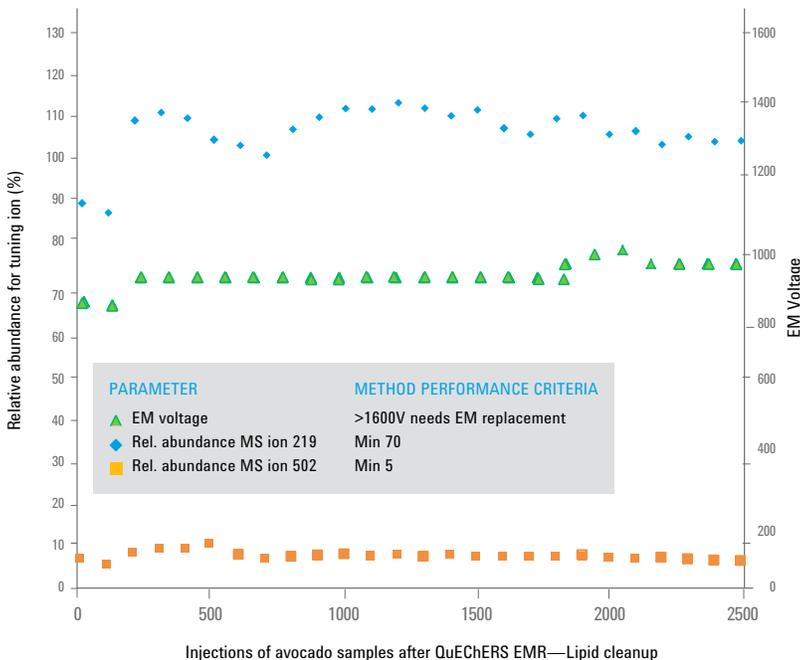
With EMR—Lipid there is less need for system maintenance and calibration due to fewer sample matrix interferences. As a result, fewer samples need to be re-run. This advantage lets you operate at higher throughput, resulting in cost savings and a more efficient lab.

Figure 7. GC/MS source conditions during 2500 injections of avocado samples, demonstrating significantly reduced frequency of MS source maintenance (cleaning or replacement) when using Agilent Enhanced Matrix Removal—Lipid.

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Pesticides	Analytes RSD over 100 injections on GC/QQQ (n = 20)		
	EMR—Lipid Cleanup	C18/PSA Cleanup	Zirconia sorbent Cleanup
Dichlorvos	6.2	10.5	16.8
2-Phenylphenol	7.0	13.6	19.5
Ethalfluralin	12.4	18.8	32.0
Sulfotep	7.1	11.8	17.2
Atrazine	6.8	12.2	19.1
Lindane	8.5	10.8	20.0
Chlorothalonil	12.5	11.7	37.4
Diazinon	6.6	11.7	16.9
Chlorpyriphosmethyl	8.4	8.9	14.9
Dichlofluanid	11.7	9.0	25.9
Aldrin	9.8	19.3	25.7
Tolylfluanid	10.5	6.6	17.8
Captan	29.9	51.9	47.1
Procymidone	6.8	14.3	22.5
Bupirimate	6.8	10.4	20.7
Endrin	8.3	12.6	24.1
Endosulfan sulfate	8.5	12.1	22.4
DDT	21.6	22.4	42.6
Iprodione	11.0	10.7	40.0
Permethrin	6.8	11.8	18.8
Parathion ethyl	11.8	7.2	13.0
TPP	9.1	19.9	28.3

Over a hundred runs of fatty sample analysis, the consistently better, effective clean up of EMR—Lipid results in lower % RSDs and greater confidence in results, compared to alternative QuEChERS procedures. Higher quality data with better precision results in less need for data re-verification, justification and fewer costly re-runs.

Figure 8. Reproducibility of pesticides analyzed (%RSD) over multiple injections of avocado samples on GC/QQQ. 50 ppb fortified avocado samples were tested every five injections, and avocado matrix blanks were injected in between. RSD > 20% are considered as unacceptable and marked in red.

The benefits of using new and innovative EMR—Lipid for QuEChERS are clear

- **Improved productivity:** better sensitivity and signal-to-noise from fewer matrix interferences enable faster data processing, and greater sample throughput.

- **Reduced lab costs:** cleaner samples using EMR—Lipid can offer significantly reduced MS source maintenance, giving you more time to analyze samples rather than spend time on costly troubleshooting, downtime, and instrument repair.

- **Simplified workflows:** standardize on an easy-to-use single-sorbent procedure that maximizes analyte recovery from a wide variety of fatty samples. Save time and money by reducing material costs, inventory, training time, and documentation, thereby streamlining your lab productivity.

- **Higher quality results:** a cleaner sample profile leads to greater data integrity and confidence in results, faster data processing, and fewer re-runs.

Part Number Description

5982-1010   Bond Elut QuEChERS EMR—Lipid dSPE

5982-0101   Bond Elut QuEChERS EMR—Lipid Final polish

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