

## Frequently Asked Questions (FAQ)

### 1. How can QuEChERS benefit me/ my work? (Matrix removal vs. analyte extraction)

The QuEChERS method is a versatile sample preparation technique that focuses on matrix removal. Because the QuEChERS method is not analyte specific, it allows you to prepare your sample for the analysis of a wide range of compounds without any need to spend time on method development.

### 2. How long does the QuEChERS procedure take? (Time)

The actual extraction and dSPE cleanup procedure should take no more than 90 minutes at the most for 25 to 30 samples. The time limiting step is weighing samples into the 50 mL centrifuge tubes in the extraction step.

### 3. Is QuEChERS compatible with my work? (Sample Preparation choice)

The QuEChERS method is applicable to your work if you are interested in eliminating matrix interferences. This technique works particularly well for solids, semi-solids, viscous liquid mixtures, and small volumes of liquid samples.

### 4. Relative to other Food Sample Prep techniques - is it expensive?

No. It costs a few dollars per sample. The QuEChERS method allows you to use less hazardous solvent in much reduced volumes. The costs of hazardous solvent disposal and general large volume solvent disposal are eliminated. At the same time, you will attain a much better cleanup of the samples, which will help increase analytical column lifetime, saving costs in buying new columns.

### 5. How do you select the appropriate dSPE kit for the QuEChERS method?

dSPE kits are selected based on the nature of your sample. Samples with high water content, but only lightly pigmented and containing no fats, such as apples, oranges, lettuce, can use the MgSO<sub>4</sub>/PSA kit. Samples that are rich in fats and waxes, but only lightly pigmented, such as coconuts, avocados, nuts, seeds, can use the MgSO<sub>4</sub>/PSA/C18E kit. Samples that are pigmented and contain little fats such as spinach, berries, peppers, can use the MgSO<sub>4</sub>/PSA/GCB kit. For samples that are rich in both pigment and fats, such as chocolate, black olives, can use the MgSO<sub>4</sub>/PSA/GCB/C18E kit.

### 6. I am not regulated by either the AOAC or EN standards. Which extraction kit should I choose?

If you are analyzing a large number of pesticides or the analytes of interest are pH dependent, you can use either buffered extraction kit. If you are only interested in several compounds or the target analytes are not pH dependent, the original non-buffered kit can be used.

**7. What is the difference between the AOAC and EN QuEChERS method?**

The AOAC and EN QuEChERS methods are both buffered and differ in the choice of buffering salts in the extraction step as well as the ratios or proportions of sample to salts and dSPE sorbent in the dispersive cleanup step.

**8. In what circumstances would you choose the 1 mL QuEChERS dSPE kit and the 8 mL dSPE kit?**

The 1 mL dSPE kit is appropriate for laboratories using large volume injection for GC/MS. The 8 mL kit requires concentration of the final extract and solvent exchange to toluene for GC/MS in order to achieve 10 ng/g detection of the pesticides.

**9. What is the role of magnesium sulfate in the extraction and dispersive cleanup step?**

Magnesium sulfate is added to absorb water in both the extraction and cleanup steps. In the extraction step, it also increases the ionic strength of the aqueous mixture and induces phase separation with acetonitrile.

**10. My QuEChERS analysis includes quite a few acidic pesticides. Will PSA lower their recoveries? What modification can I adapt?**

It is possible that PSA sorbent retains acidic analytes. If this is a concern, you can omit the dSPE step and directly analyze supernatant from the extraction step. You can also compare results with and without dSPE using PSA to decide whether a PSA cleanup is appropriate for your sample.

**11. Why does the QuEChERS method recommend homogenizing frozen sample with dry ice/liquid nitrogen and extracting samples while frozen?**

Homogenizing frozen sample with dry ice or liquid nitrogen prepares the sample into a fine powder (smaller particle size & more evenly homogenized), maximizing surface area for extraction while making sample easier to handle. Samples should be extracted while frozen to prevent analyte degradation.

**12. When I reconstitute my extract obtained using the QuEChERS method in the LC/MS mobile phase solvent, precipitates appear. What can I do to overcome this?**

If precipitates appear during reconstitution, you can sonicate and centrifuge to see if precipitates go into solution. If the reconstitution solvent is a percentage of methanol in water, add methanol first to solubilize sample. Sonicate and vortex before adding water.

**13. Why is the original QuEChERS method non-buffered?**

The original non-buffered QuEChERS method was developed for an analysis of fewer pesticides. When the method was used for a larger pesticide screen, quite a few compounds demonstrated pH dependency. Therefore the buffered methods were introduced.

**14. In the extraction step of the QuEChERS method, what are the AOAC guidelines for adding extraction salts, and solvent?**

For every gram of homogenized sample, 1 mL of 1% acetic acid in acetonitrile and 0.5 g of anhydrous magnesium sulfate/sodium acetate (4/1, w/w) are recommended per AOAC 2007.01.

**15. In the dispersive SPE step of the QuEChERS method, what are the AOAC guidelines for adding magnesium sulfate and SPE sorbents?**

For every 1 mL of sample from the extraction step, 200 mg in a 3:1 ratio of magnesium sulfate/SPE sorbent(s) is recommended. For example, when an 8 mL aliquot from the extraction step undergoes the dispersive SPE cleanup step, 1200 mg of magnesium sulfate and 400 mg of PSA is recommended.

**16. In the QuEChERS method, how much (in volume) initial extract and dSPE extract should I expect after centrifugation?**

A 15 g sample yields around 11-14 mL of initial acetonitrile extract, depending on the water content of the sample. In the dSPE step, almost half of the extract will be lost to dSPE blend of salts and sorbents, resulting in roughly 6 mL of final extract from a 15 g sample.

**17. What modification can you apply for dry samples to improve the extraction step in the QuEChERS method?**

For dry samples containing less than 80% water, you can start with half the sample amount and add cold water to make up water content to 15 g for the AOAC method and 10 g for the EN method. EN 15662 provides specific guidelines for water addition to different matrices. For example, addition of 10 mL of water is recommended for 5 g of cereal sample.

**18. While using the QuEChERS extraction kit, I accidentally spilled some of the salts when dispensing into the centrifuge tube. Will my results be affected?**

Salts in the QuEChERS extraction step are used in excess. Primarily salts are added to remove some water and induce phase separation between acetonitrile and water. Spilling some of it (<1g) will not affect your results.

**19. Is it necessary to dry down and reconstitute the extract from the dSPE step in the QuEChERS method for LC/MS analysis?**

Evaporating the sample and reconstitute it in initial LC mobile phase solvent improves chromatography. It is highly recommended, but not required. If the analytes of interest do not elute early in the chromatogram, you can likely get away without sample dry down and reconstitution.

**20. What is the approximate pH that samples will reach using citrate salts per EN 15662 method? What is the buffering range?**

The pH range most samples will reach is between 5-5.5. The buffering range is approximately between pH 2-7.4