

Thermo Scientific TLX Systems provide an online sample extraction for biological fluids, effectively reducing the interference caused by the serum and plasma matrices in LC-MS/MS analysis.

Reducing Matrix Effects



Endogenous phospholipids, present in extremely high levels in biological samples, are a major component of matrix interference. These interferences affect analyte ionization, resulting in loss of reproducibility and precision during quantitative analysis. Thermo Scientific TLX Systems provide the option of maintaining LC-MS/MS data quality while managing the matrix effects caused by endogenous phospholipids in the analysis of serum and plasma.

TLX System Advantages

TLX Systems manage the matrix effect using two principles:

- The TurboFlow® column initially removes over 99% of phospholipids from the analyte (Figure 1).
- The TLX System separates the remaining phospholipids from the peak of interest using an analytical column (Figure 2).

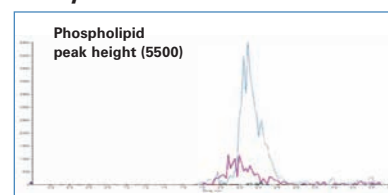
Because of this two-dimensional feature, TLX Systems effectively reduce the ion suppression in serum and plasma samples, which is mainly caused by endogenous phospholipids.

The TurboFlow Method

TLX Systems reduce the interference caused by biological fluids by injecting the untreated sample onto a patented TurboFlow column. The TurboFlow column retains the analyte through its column chemistry while the size exclusion properties of the column allow the high molecular weight portion of the matrix to flow to waste. On TLX Systems, over 99% of the phospholipids are removed by the TurboFlow column.

Significant Reduction of Phospholipids with TLX Systems

TLX System



Protein Precipitation

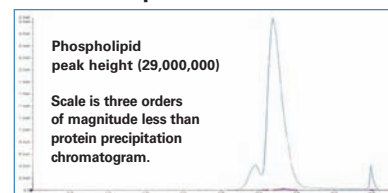


Figure 1. Phospholipids are present in protein precipitated plasma samples (PPT). A significant reduction in phospholipid is observed in raw plasma samples run on the TLX System.

Further Reduction of Matrix Interference

Although the TurboFlow column removes more than 99% of endogenous phospholipids, the effect of those that remain can be managed on the TLX System with an optimized method. This method elutes the interfering phospholipids separately from the compounds of interest.

By changing the pH of the loading mobile phase, or working with the TurboFlow analytical column combination, the compound of interest can often be made to elute before or after the interfering phospholipids, thereby, reducing the ion suppression or enhancement they cause.

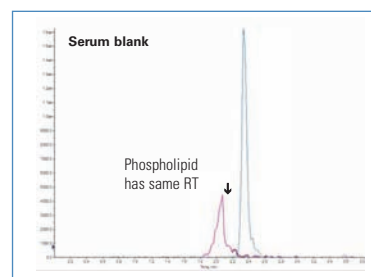
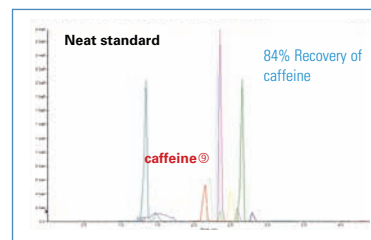
Ion Suppression is Nearly Eliminated with the TLX System

The online extraction system nearly eliminates endogenous phospholipids that cause ion suppression. Remaining phospholipids can be made to elute before or after the compound of interest. Because of this unique two-dimensional feature, the TLX System provides the most effective sample extraction available for LC-MS/MS applications.

References

Brann, John; Esposito, Chris, Matrix Removal and Matrix Effect Elimination by HTLC/MS/MS. Thermo Scientific, Franklin, MA, ASMS 2006.

Analyte and Phospholipid Have Same Retention Times Using a PolarPlus TurboFlow Column



Analyte and Phospholipid Have Different Retention Times using a Cyclone® TurboFlow Column

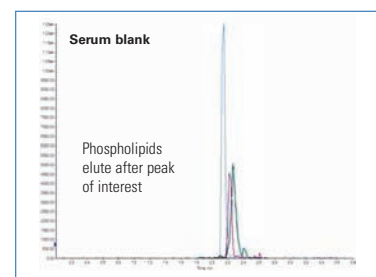
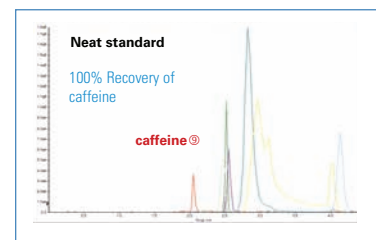


Figure 2. When caffeine and the phospholipid have the same retention time, some ion suppression is present. With a change in TurboFlow column chemistry, the interfering phospholipid elutes after caffeine, effectively reducing the ion suppression.

No Significant Ion Suppression with the TLX System

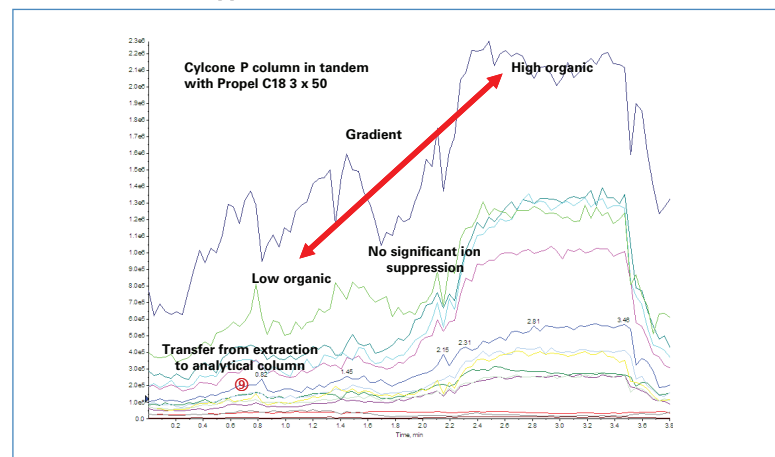


Figure 3. Blank serum is injected onto a TLX System with post column infusion of the analyte. No significant drop in signal from ion suppression was observed.