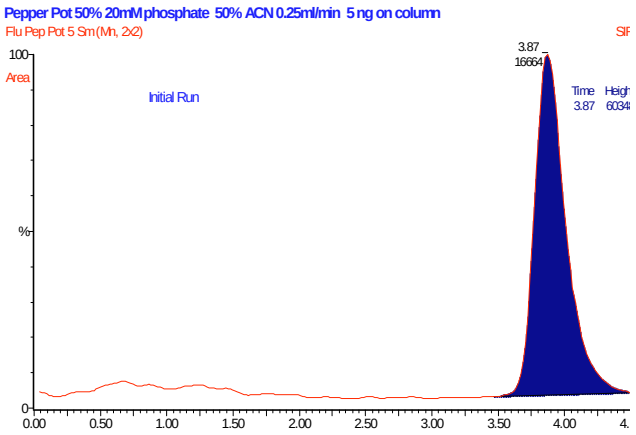
Waters Alliance™ Systems for LC/MS ESI/APCI Applications

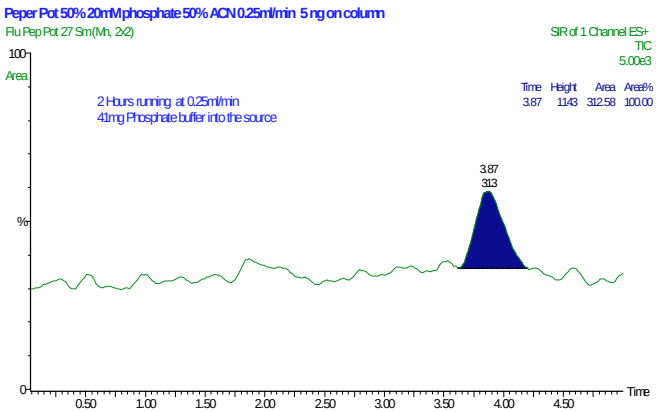
A Phosphate Buffer Study: Performance Comparison of Various LC/MS API Interfaces Using Phosphate Buffer Containing Mobile Phase

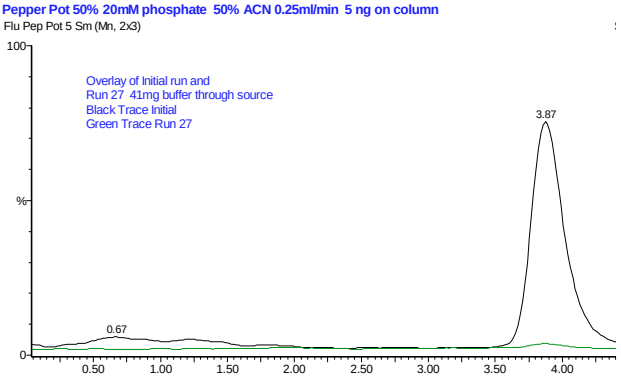
Highlights: The following study was performed in response to the ubiquitous question; "Can I run phosphate buffered mobile phases through my benchtop LC/MS system?" Although it is not recommended that phosphate buffer containing mobile phases be utilized continuously, the following study highlights the occasional (albeit prudent) use of involatile components in one's mobile phase.

A reverse phase analysis of a typical pharmaceutical compound, Flunitrazepam, a hypnotic, was performed using mobile phase containing 10 mM phosphate buffer. Multiple injections were performed at a flow rate of 0.25 ml/min. The peak area of the Flunitrazepam was monitored as a function of system performance. The tolerance to involatile materials in the mobile phase of the various LC/MS counter electrodes or interfaces for the Waters Alliance™ LC/MS systems was examined. The counter electrodes studied were the "Pepperpot" and the CrossFlow™ counter electrodes available on the Platform LC Detector, and the ZSpray interface available on the Platform LCZ Detector. Each interface performed differently under the same conditions demonstrating various levels of tolerance to involatile mobile phase materials.

Analysis of a Benzodiazepine in Mobile Phase Containing 10 mM Phosphate Buffer Using the "Pepperpot" Counter Electrode:



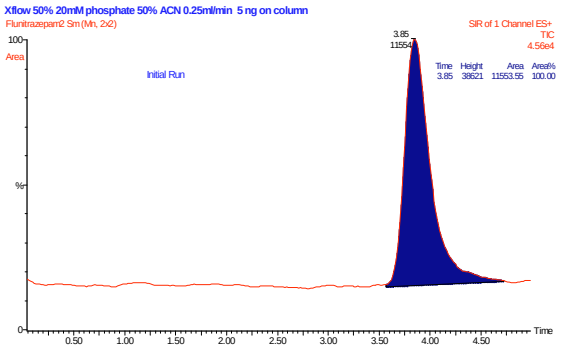


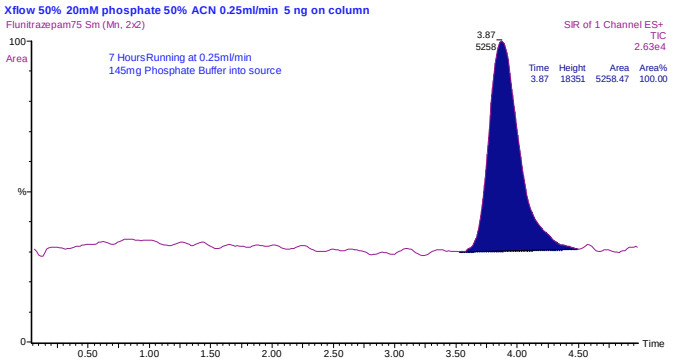


Conditions:

Column: Waters Symmetry® C-18 2.0 X 150 mm
Mobile Phase: 50% 20mM Sodium Phosphate Monobasic 50% Acetonitrile at 0.25 ml/min
Sample: Flunitrazepam at 1ng/ul 5ul injected
Monitored in SIR mode at 314m/z

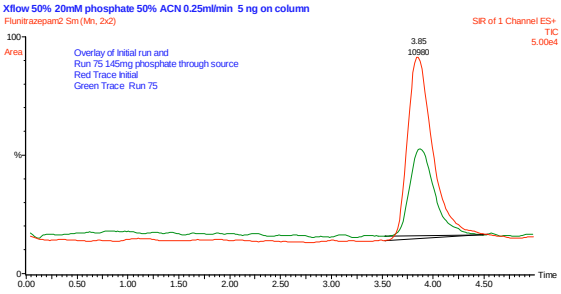
Analysis of a Benzodiazepine in Mobile Phase Containing 10 mM Phosphate Buffer Using the CrossFlow™ Counter Electrode



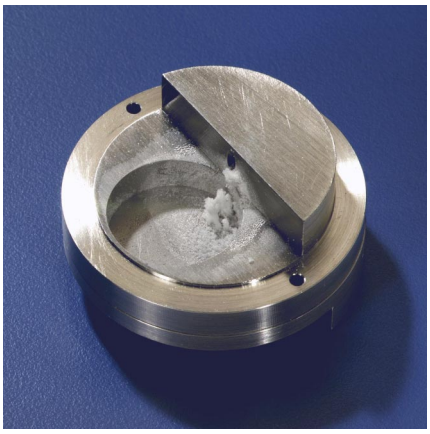


CrossFlow allows the use of involatile buffers in mobile phase composition with higher tolerance than the "Pepperpot" Counter Electrode.

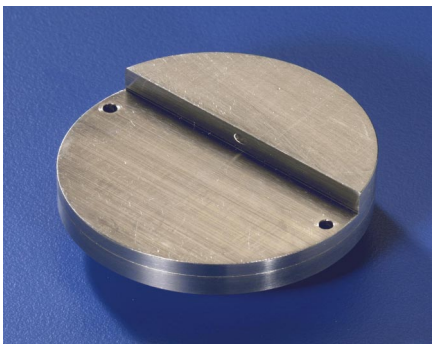
Conditions:
Column: Waters Symmetry C-18 2.0 X 150 MM
Mobile Phase: 50% 20mM Sodium Phosphate Monobasic 50% Acetonitrile at 0.25 ml/min
Sample: Flunitrazepam at 1ng/ul 5ul injected Monitored in SIR mode at 314m/z



A

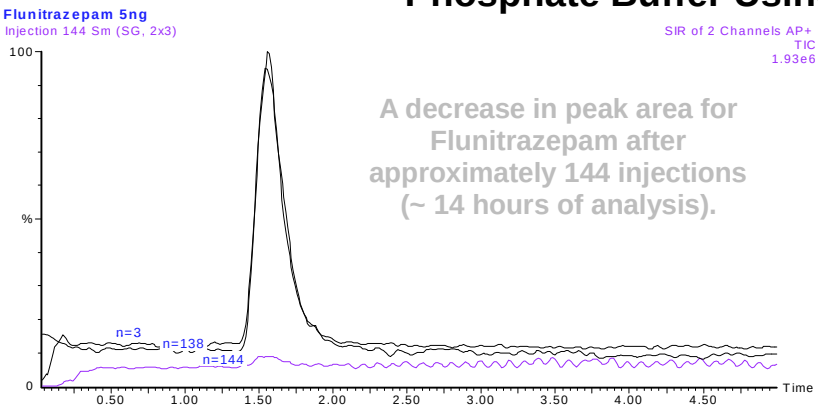


B



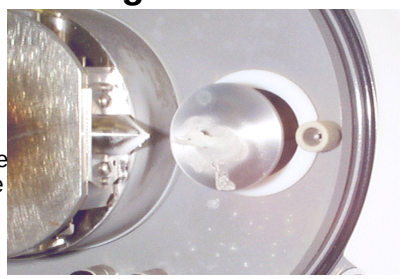
Salt Buildup on CrossFlow™ Following Compound Analysis Using Phosphate Buffer-Containing Mobile Phase:
A: is the front of the counter electrode showing a great deal of salt deposit. B: shows almost no salt on the back of the counter electrode. Therefore there is no detrimental contamination of the mass analyzer. Following simple cleaning, the system can be used again in a short period of time.

Analysis of a Benzodiazepine in Mobile Phase Containing 10 mM Phosphate Buffer Using ZSpray



A decrease in peak area for Flunitrazepam after approximately 144 injections (~ 14 hours of analysis).

Salt buildup on the ZSpray source during phosphate buffer study.



By comparison, the ZSpray interface was much more tolerant of involatile materials with no sacrifice in sensitivity. Here we see salt build up on the sampling cone after 14 hours of operation. Cleaning did not necessitate breaking vacuum, and in ten minutes, the system was fully functional again.

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