Automated Solid Phase Extraction (SPE) Method Development using Oasis Mixed Mode Sorbent Selection Plate

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INTRODUCTION

- Quantitative analysis of complex biological samples using LC-MS often require extensive sample cleanup procedures prior to analysis.
- Coeluting matrix components can adversely effect the quantitation of target analyte by LC-MS.
- Mixed-mode SPE are effective and well proven technique for sample cleanup.
- Developing mixed-mode SPE methods however can be a tedious process requiring.
  - ♦ Good understanding of the analyte and the SPE sorbent chemistries to develop an effective mixed-mode SPE method.
  - ♦ Furthermore, most SPE workflows involve several steps of pipetting and transfer of samples, reagents and solvents.
  - ♦ Automation of these steps using expensive liquid handlers often involve complex programming, requiring expert or trained personnel to perform the task.
  - ♦ Performing workflows manually can be extremely tedious and prone to errors, demanding good analytical skills for a reproducible result.
- The Oasis 2x4 Sorbent Selection method using four different mixed mode sorbents and just two optimized and proven protocol (Figure-1) facilitate easier mixed-mode SPE method development.
- Here we present automation of this proven Oasis 2x4 method development protocol using **Andrew+ pipetting robot .**
- To demonstrate the automated Andrew+ pipetting robot SPE method development workflow, four (4) analytes were extracted from eight (8) replicate spiked human blood plasma.

METHODS

- Oasis 2x4 method development protocol described in Figure 1. was automated.
- Automation was performed using Andrew+ Pipetting Robot , controlled and programmed using a browser-based software called OneLab.
- Figure 2 shows the Andrew+ pipetting robot setup for the Oasis 2x4 method development automation.
- Andrew+ pipetting robot was setup (Figure 2) using one 10-300 µl, one 100-5000 µL single channel pipette, one 5-120 µL, one 50-1200 µL 8-channel pipettes, One SPE Vacuum Manifold, one each of deepwell microplate, microtube, 8-channel pipette reservoir, tip rack holder, 50 mL conical centrifuge tube and three tip-insertion system Dominos.
- Analyte quantitation were performed using Waters® ACQUITY UPLC® I-Class coupled to Xevo™ TQ-S-MS in multiple reaction monitoring, positive and negative ionization mode (MRM).

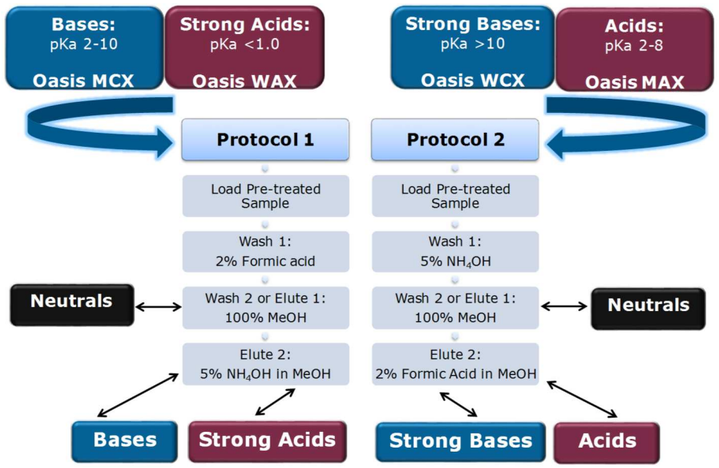

Figure 1. Oasis 2x4 Method Development Protocol

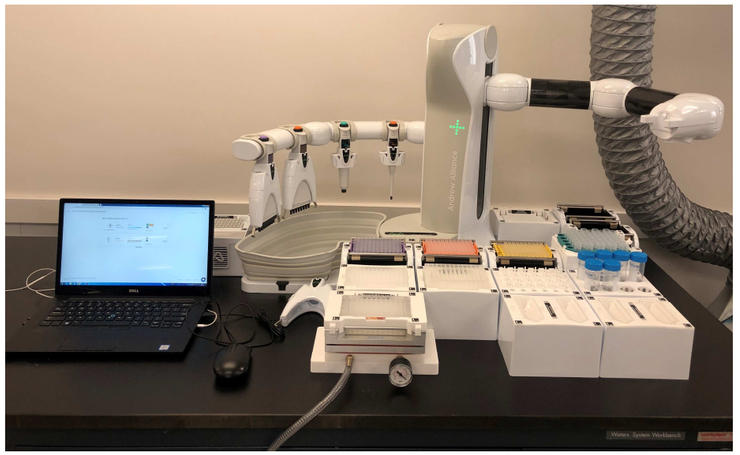

Figure 2. Andrew+ Automation Workflow Setup for Oasis 2x4 Method Development

RESULTS AND DISCUSSIONS

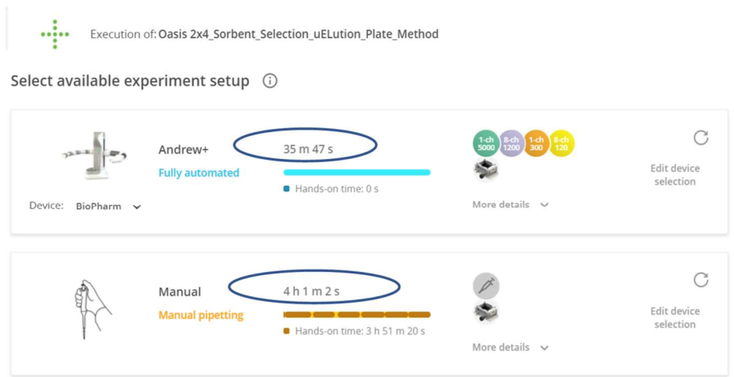

Figure 3. Shows the total time required to complete the Oasis 2x4 method development. Automated workflow with Andrew+ is completed under an hour while manually performing the method development would be over 4 hour.

- Oasis 2x4 sorbent selection plate provides a quick and easy process to develop an SPE method, using four different mixed mode sorbent chemistries in a single plate and just two protocols to determine the best SPE recovery conditions.
- Automation of the SPE method development and sorbent selection provides both quicker and highly reproducible method development .

CONCLUSION

- **The Oasis 2x4 SPE method development workflow is automated using the Andrew+ robot with labware that are commonly used in laboratory settings for convenient setup and execution.**
- **All the steps from preparing the spiked analyte samples to performing the load, wash and elution steps of the SPE is automated, The only manual intervention required is to change the SPE sample collection plate from the vacuum manifold between the wash and elution steps of the protocol.**
- **Automation of the Oasis 2x4 SPE sorbent selection method development, produces quick optimization of analyte recovery combined with good reproducibility saving approximately 2 to 3 hours of manual effort.**

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