FAST ANALYSIS FOR SEVERAL EPA WATERS METHODS USING ACQUITY ULTRAPERFORMANCE LC

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INTRODUCTION

Fast analysis of target analytes is important to any laboratory in terms of throughput, cost control and overall efficiency. Various EPA water methods[1-6] describe chromatographic separations which can be as long as 30 minutes or more.

Recently, a new technology known as ACQUITY UltraPerformance LC® based on columns packed with a Bridged Ethyl Hybrid (BEH), 1.7 micron particle size material and using a high pressure fluidics module generating pressures up to 14000 psi has allowed the high efficiency separation of numerous analytes in 15 minutes or less.

Here we apply this technology to several EPA methods including Method 532– Phenylureas, Method 554– Derivatized Carbonyl Compounds, Method 555– Chlorinated Pesticides, Method 549.2- Diquat and Paraquat, Method 610– PolyNuclear Aromatic HydroCarbons and Method 8330B– Explosives

Standard Preparation:

Stock Standard mixtures for each method were purchased from AccuStandard, New Haven Conneticut. Each mixture was diluted to the concentration shown . Separation conditions for each method are included with the pertinent chromatogram .

RESULTS

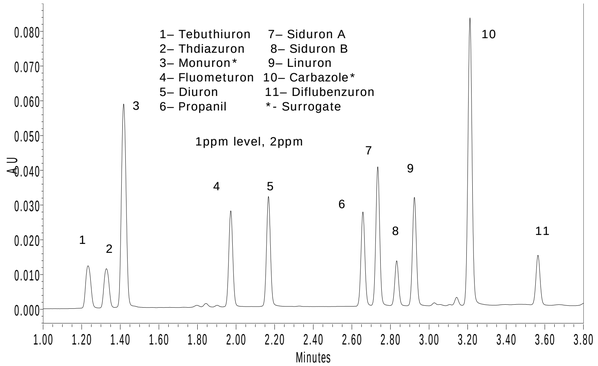

Figure 1. Method 532- Phenylureas

Conditions :

System: ACQUITY UPLC® with PDA
Eluent: 25 mM Phosphate / Acetonitrile gradient @ 0.7 ml/min
Column: 2.1 X 100 mm BEH C_{18}, 1.7 µ @ 43.0 ° C
Injection Volume: 5.0 µl
Detection: UV @ 245 nm
Data: Empower™ Software

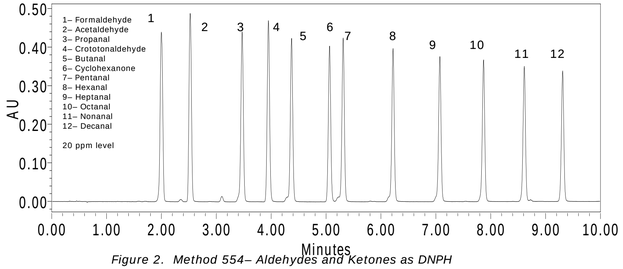

Figure 2. Method 554– Aldehydes and Ketones as DNPH Derivatives

Conditions :

System: ACQUITY UPLC® with PDA
Eluent: 90:10 Water– THF / Acetonitrile gradient @ 0.5 ml/min
Column: 2.1 X 100 mm BEH Phenyl, 1.7 µ @ 35.0 ° C
Injection Volume: 5.0 µl
Detection: UV @ 360 nm
Data: Empower™ Software

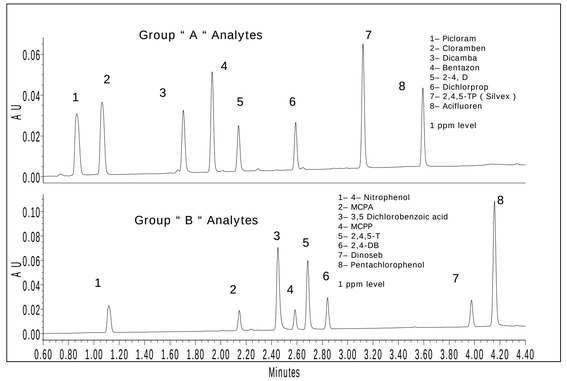

Figure 3. Method 555– Chlorinated Acids

Conditions :

System: ACQUITY UPLC® with PDA
Eluent: 25 mM Phosphoric acid / Acetonitrile gradient @ 0.6 ml/min
Column: 2.1 X 100 mm BEH C_{18}, 1.7 µ @ 40.7 ° C
Injection Volume: 5.0 µl
Detection: UV MaxPlot
Data: Empower™ Software

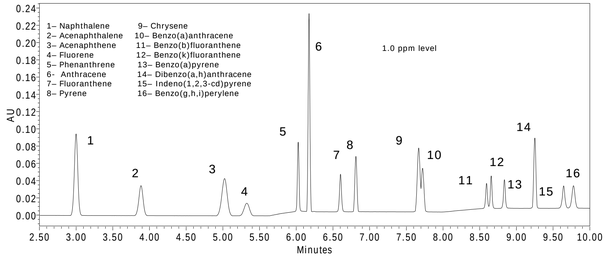

Figure 4. Method 610– PolyAromatic Hydrocarbons

Conditions :

System: ACQUITY UPLC® with PDA
Eluent: Water / Acetonitrile gradient @ 0.6 ml/min
Column: 2.1 X 100 mm BEH Shield RP $_{18}$, 1.7 µ @ 30.0 ° C
Injection Volume: 5.0 µl
Detection: UV MaxPlot
Data: Empower™ Software

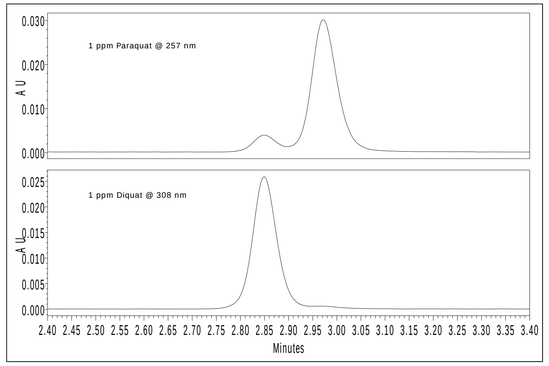

Figure 5. Method 549.2– Diquat and Paraquat

Conditions :

System: ACQUITY UPLC® with PDA
Eluent: 15% 100 mM Ammonium Formate pH– 3.5 / 85% Acetonitrile @ 0.5 ml/min
Column: 2.1 X 100 mm BEH HILIC, 1.7 µ @ 30.0 ° C
Injection Volume: 5.0 µl
Detection: UV @ 257nm– Paraquat, UV @ 308nm– Diquat
Data: Empower™ Software

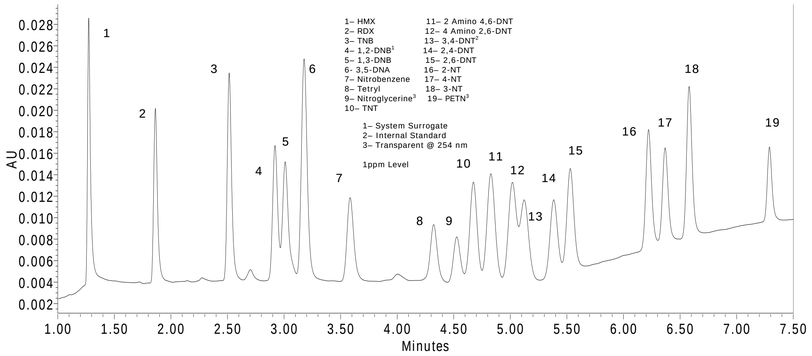

Figure 6. Method 8330B– Nitroaromatics, Nitramines and Nitrate Esters (Explosives)

Conditions :

System: ACQUITY UPLC® with PDA
Eluent: Water / Methanol gradient @ 0.5 ml/min
Column: 2.1 X 100 mm BEH C $_{18}$, 1.7 µ @ 55.4 ° C
Injection Volume: 5.0 µl
Detection: UV @ 210 nm
Data: Empower™ Software

CONCLUSION

Fast separations can be achieved using ACQUITY UltraPerformance LC®. This in turn leads to lower solvent consumption and faster throughput. Ultimately this results in a more efficient cost effective operation.

References:

1. M.V. Basset et al, USEPA Method 532 rev 1.0, June, 2000
2. J. W. Hodgeson et al, USEPA Method 549.2 rev 1.0, June, 1997
3. J. W. Eichelberger, US EPA Method 554 rev 1.0, August, 1992
4. J. W. Eichelberger, US EPA Method 555 rev 1.0, August, 1992
5. USEPA Method 610
6. USEPA Method 8330B rev 2.0, October, 2006

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