Combining Thin-Layer Chromatography (TLC) and UltraPerformance Liquid Chromatography (UPLC) with Mass Detection in a Synthetic Chemistry Environment

Mass spectrometry is a technique that has become increasingly important to academic research, providing both quantitative and qualitative information for many applications across a range of laboratories, including those focused on synthetic chemistry. Combining an ACQUITY™ UPLC™ System with the ACQUITY QDa™ Mass Detector (Figure 1), alongside the CAMAG™ TLC-MS Interface 2, provides a versatile approach towards rapid and comprehensive results for the synthetic chemist.

COUPLING TLC TO MASS DETECTION

Thin-layer chromatography (TLC) is a very popular, simple chromatographic technique used to separate components within mixtures. In a synthetic chemistry laboratory this technique can be used to monitor the progress of a reaction, identify compounds in a mixture, or crudely determine the purity of a substance. Component retention factor (Rf) is generally used to identify components against a known standard. However, a more selective and convenient approach to compound identification is to use mass detection.

The CAMAG TLC-MS Interface 2 (shown in Figure 2) provides a simple approach to the elution of TLC spots from a TLC plate, transferring the compounds of interest to the ACQUITY QDa Detector. To sample a TLC plate, the plate is positioned on the platform such that the TLC spot of interest is aligned with an elution head, and subsequently the component(s) of interest are transferred to the ACQUITY QDa (Figure 3).

Highlighted accessibility benefits of the ACQUITY QDa Detector:

- Fully-automated internal invisible calibration
- Minimized footprint and site requirements
- Completely tool-free routine maintenance
- Simply switch OFF after use - rapid start-up to ready time

Highlighted specifications of the ACQUITY QDa Detector:

- Pre-optimized electrospray ionization (ESI)
- Mass range *m/z* 30-1250
- Full scan and selected ion recording (SIR) modes
- Positive and negative polarity switching

Figure 1. ACQUITY UPLC System with ACQUITY QDa Mass Detector.

Figure 2. CAMAG TLC-MS Interface 2.

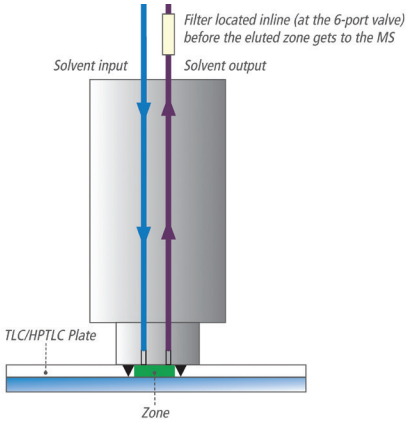

Figure 3. Components of interest transfer.

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A Versatile Solution for Synthetic Chemists: Combining ACQUITY QDa with HPLC/UPLC and TLC

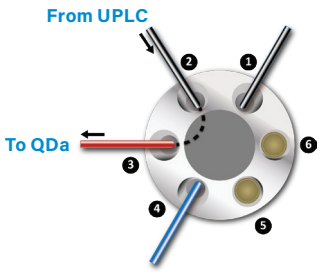
Waters offers an optional ACQUITY Diverter Valve that can be used in a combined system configuration allowing programmed selection of a UPLC-QDa or TLC-QDa workflow. Figure 4 shows how the diverter valve can either allow direct flow from the UPLC into the mass detector (Position 1) or re-route the UPLC flow through the TLC-MS Interface 2, eluting components within TLC spots, into the mass detector (Position 2).

Summary

A combined system, enabling programmed selection of the rapid TLC-QDa workflow or a more comprehensive UPLC-QDa separation, provides a versatile and accessible walk-up solution for chemists. The mass detector enhances the information that is provided to the chemist which ensures they have greater confidence in the decisions they make and the results they provide.

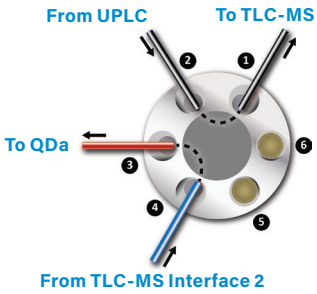
*ACQUITY UPLC H-Class PLUS System**

Valve Position 1 – UPLC-QDa Mode



ACQUITY QDa with ACQUITY Diverter Valve

Valve Position 2 – TLC-QDa Mode



CAMAG TLC-MS Interface 2

** QDa stacks within ACQUITY UPLC stacks. Shown separately for demonstration purposes.*

►▻ Learn more at www.waters.com/QDa and www.camag.com/interface2

References:

1. ACQUITY QDa Detector – Starting Point Settings and Optimization Guidelines, Mar 2016. Waters P/N: 715004968 rev A.
2. Instruction Manual TLC-MS Interface 2, Dec 2015. https://www.camag.com.
3. The Mass Spectrometry Primer. Waters P/N: 715001940.
4. Evaluation of the Robustness of the ACQUITY QDa Detector in an Open Access Drug Development Laboratory. Waters P/N: 720005649EN.
5. A Novel Compact Mass Detection Platform for the Open Access (OA) Environment in Drug Discovery and Early Development, Helmy et al, Journal of Pharmaceutical and Biomedical Analysis, 122 (2016) 1-8.

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