Waters™

アプリケーションノート

The Use of MassLynx Open Access for LC-MS Accurate Mass Measurements Experiments

Janet Hammond, Emmanuelle Claude

日本ウォーターズ株式会社

This is an Application Brief and does not contain a detailed Experimental section.

Abstract

This application brief demonstrates the benefits of using the OpenLynx Open Access Application Manager for MassLynx Software for LC-MS accurate mass measurements experiments.

Benefits

From system administration and instrument management, to data processing, to reporting, OpenLynx Open Access offers many benefits to medicinal chemistry.

Introduction

There has been a growing demand on the pharmaceutical industry to improve and accelerate the drug development process. This has resulted in new working practices being introduced into all stages of the drug discovery and development process in order to ensure quality, drive efficiency, and increase productivity.

Medicinal chemists analyze more than 100,000 samples a year by liquid chromatography/mass spectrometry (LC-MS) for monitoring synthetic reactions and investigating the structure or purity of new chemical entities. This has been achieved by using OpenLynx Open Access (OA) Software, providing the chemists with fully automatic workflow systems that lead them through sample submission, method selection, and reporting options. Traditionally, this work was carried out using a single quadrupole mass spectrometry and therefore only nominal mass information was available. Using OA on a timeof- flight (Tof) instrument allows the chemist to acquire accurate mass information.

This provides them with an extra degree of specificity and more confidence about assignments of chemical entities produced from their chemical reactions.

In this work, a four-component mix is used to test the robustness and accuracy of a typical workflow in a pharmaceutical open access laboratory.

Results and Discussion

Simplified administrator management of users

Managing Groups and Users with Open Access OA has been simplified with the addition of a User Management dialog box (Figures 1A and 1B). The administrator can now define groups and assign users to those groups.

As seen in Figure 1C, the options for each group include email, plate layout display, single sample file login, printing of the OALogin report file, sample ID format, barcode support, methods order, enable multiple methods per sample, rename report files, and walk-up parameters available for the each user.

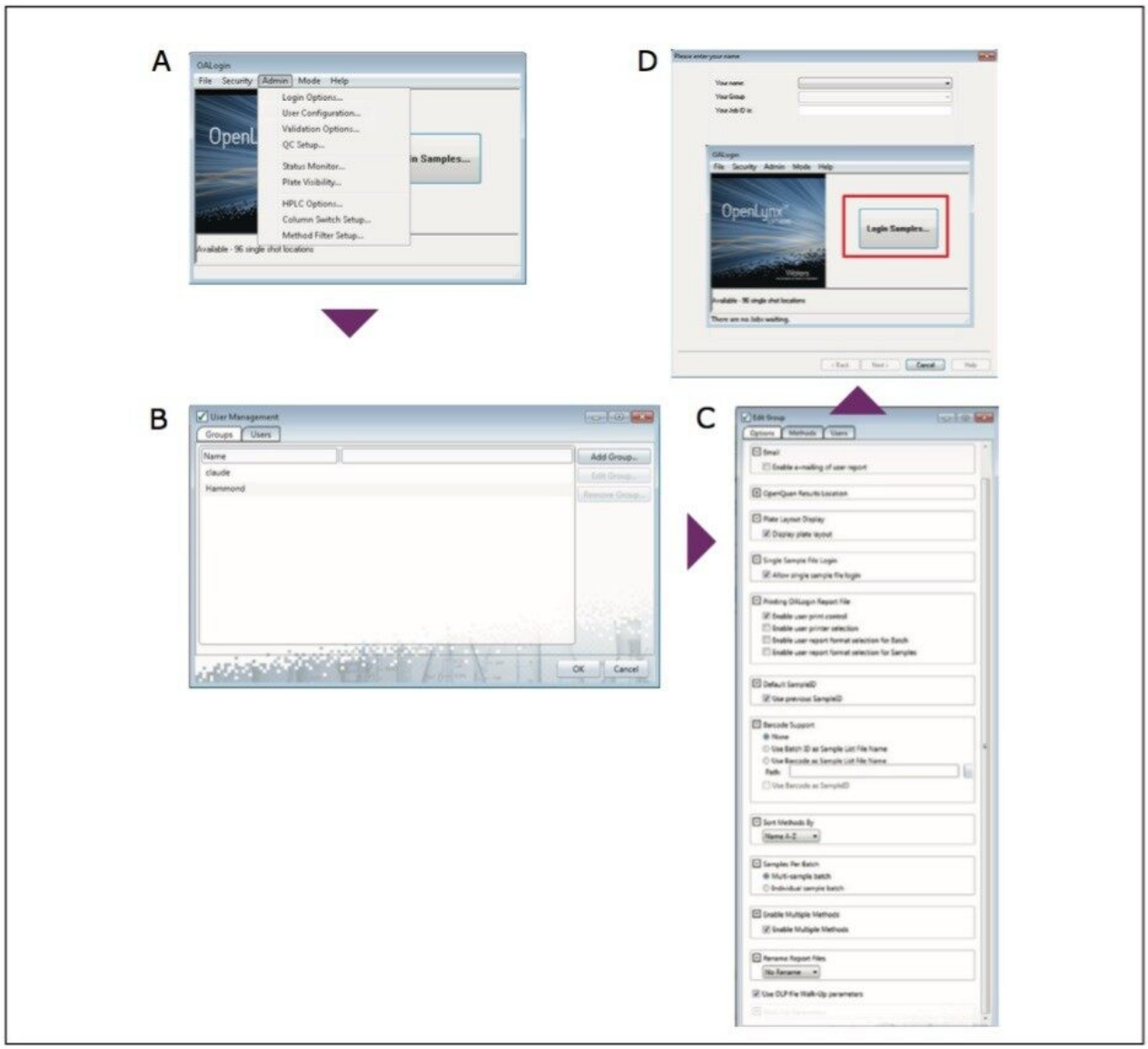

Figure 1. User management options available with OpenLynx OA Software.

Using a Xevo G2QTof with MassLynx’ s OpenLynx Open Access Software for LC-MS accurate mass measurements, a four-component mixture comprised of caffeine (*m/z* 195.0882), acetoaminophenol (*m/z*

152.0712), sulphadimethoxine (*m/z* 311.0814), and verapamil (*m/z* 455.2910) was analyzed. The samples were loaded onto a 48-well plate and samples were injected over a four-day period. In total, 240 samples were analyzed (day 2 had 2 injections cycles).

The Tof calibration procedure was only carried out at the beginning of day 1. The lock spray calibrant was leucine encephthalin. A two-point lock mass of 278.1141 and 556.2771 was applied in order to gain better accuracy for the low molecular weight components.

Figure 2 shows the Root Means Square (RMS) average of the four compounds over the four days. The mass accuracy of the workflow is of very good quality as the RMS are well within 5 ppm without any drift over time.

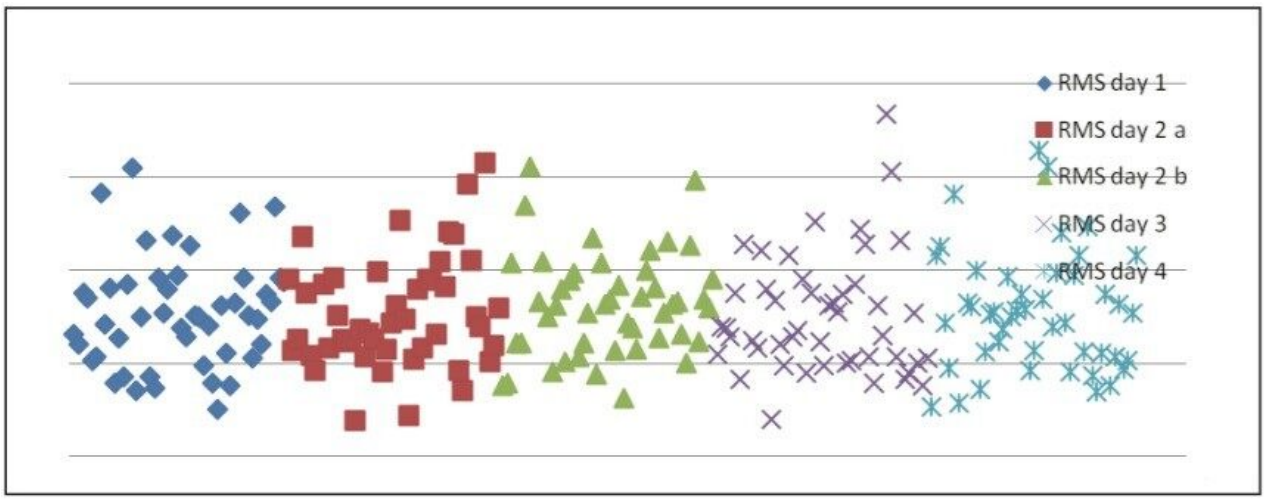

Figure 2. Xevo G2 QTof System demonstrates good robustness.

The final reporting is a key feature of the OpenLynx Open Access process. For a single sample reports, the report name can be based on sample ID, raw file name, bar code, or a user-defined name. In the case of multisample reports, the name can be based on the job ID, bar code, or a user-defined name.

Figure 2 shows an example of a final report. Page 2 of the report highlights in green that four individual components have been found. It is also possible to specify different ranges of values for the chromatogram plots to maximize the visual impact and to illustrate the important information. This is shown on page 3 of the report, where the MS extracted chromatogram retention range is displayed between 1 and 4 min compared to the UV chromatograms, which is displayed between 0 to 4.5 min.

From the accurate mass measurement, elemental composition is calculated for each analyte using the i-FIT algorithm, which takes into account distribution of the spectral isotopes and simplifies the final number of the possible elemental formulas.

Reports can be emailed to any laboratory PC using the built-in secure email client.

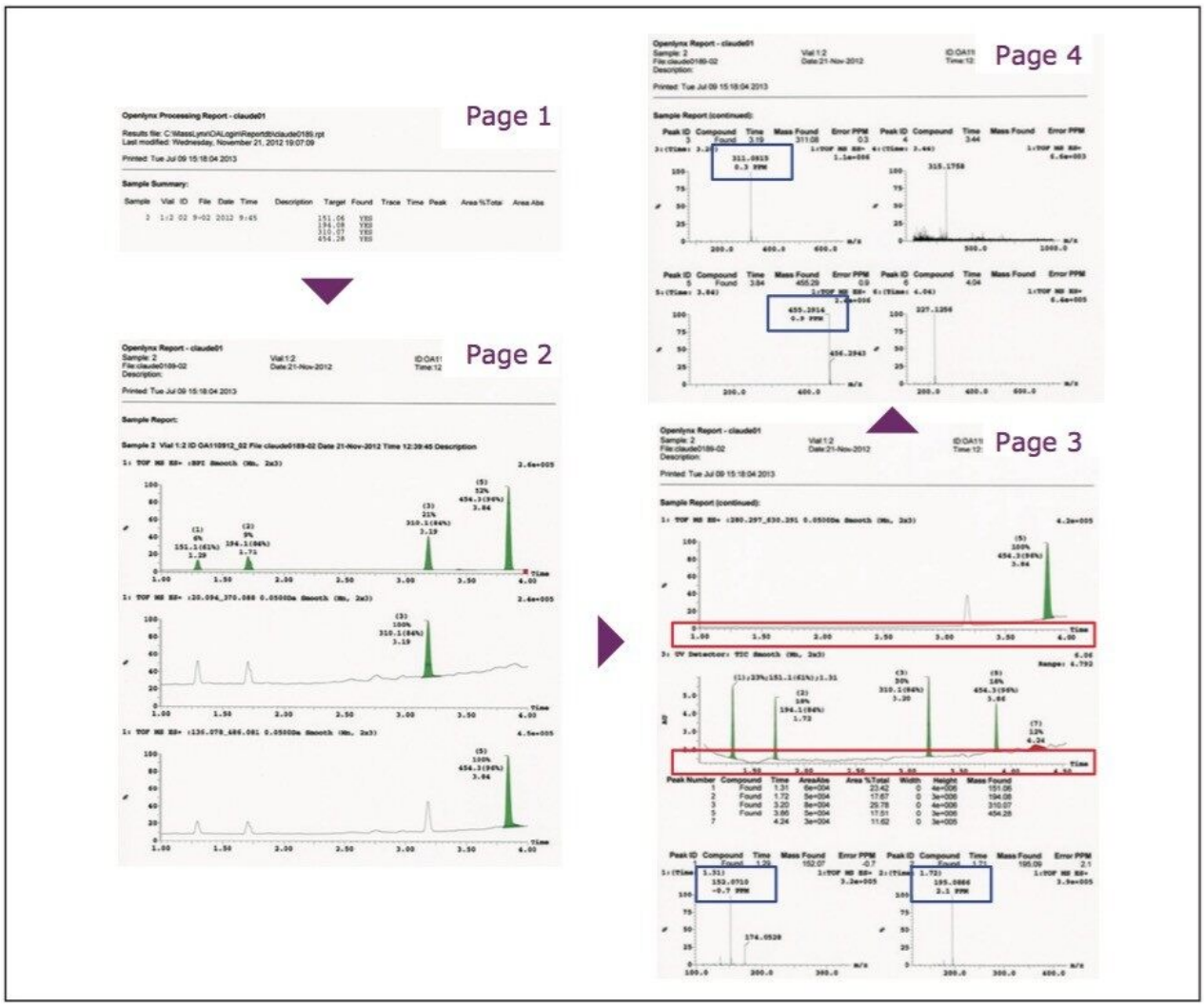

Figure 3. Flexible reporting with OpenLynx OA Software.

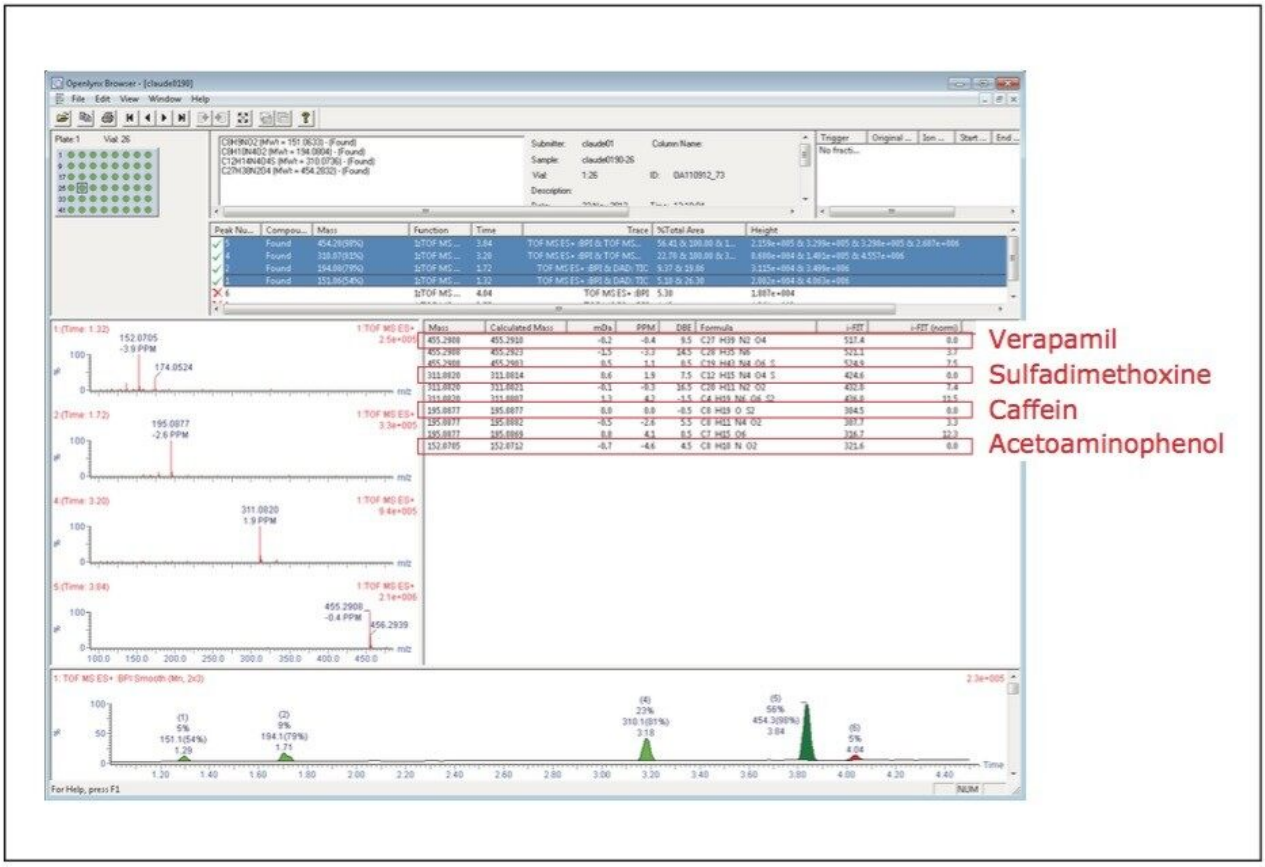

Figure 4. Calculation of accurate mass measurement.

Conclusion

Utilising MassLynx’s OpenLynx Open Access Software for LC-MS accurate mass measurements benefits both the administrator of the system and medicinal chemist:

- Allows simplified administrator management with the introduction of groups and the ability to assign users to particular groups.
- Provides confidence that the system was robust with no drift over time and the mass measurements within a 5 ppm window.
- From the accurate mass measurement and the i-FIT algorithm, the medicinal chemist is provided with a reduced number of elemental compositions of their compounds.
- Confirmation of the elemental composition is provided with minimal training on the instrument for the medicinal chemist.

- There is flexibility in the final reporting to maximize the visual impact to illustrate important information.

Featured Products

MassLynx MS Software <https://www.waters.com/513662>

OpenLynx Open Access <https://www.waters.com/10008851>

720004856, January 2014