

Adding SFC to a HPLC-MS system: Smooth switching between analytical SFC and LC-MS based on Aurora SFC and Bruker MicrOTOF



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Abstract

A full analytical SFC system is expensive and may be hard to justify if not used extensively.

Here we present an analytical system that can switch between SFC and LC-MS based on the Aurora SFC Fusion A5 module, Agilent 1100 HPLC modules and Bruker Daltonics MicrOTOF.

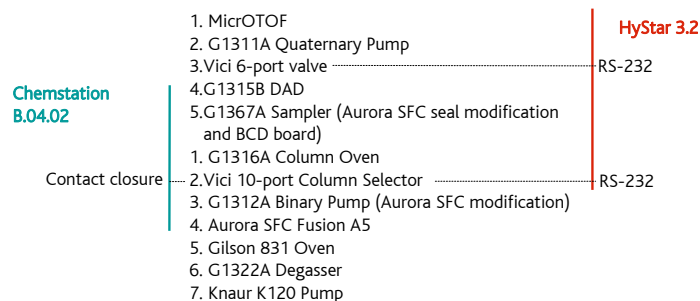
The switching is done by change of active software platform *i.e.* ChemStation for SFC and in this case HyStar for LC-MS.

As an add-on a column selection valve and an extra column oven has been installed for automated method development for chiral SFC.

Hardware and Controlling Software

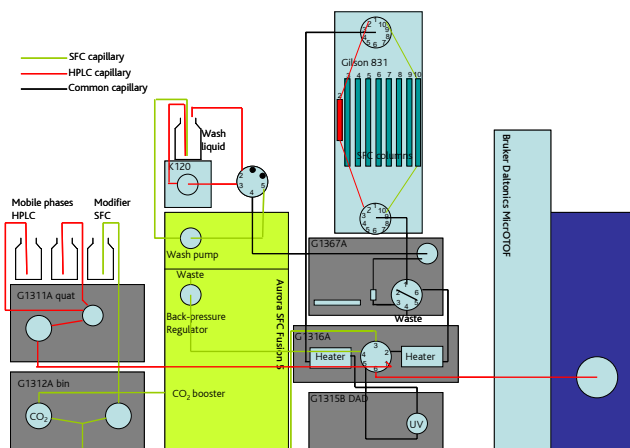
The Aurora SFC Fusion 5 module was added to an existing MicrOTOF/Agilent LC-MS System running under Hystar 3.2. with a quaternary LC-pump. For the sake of clarity makeup pump and internal reference pump are omitted in this presentation.

Apart from the Aurora SFC module and a binary pump with Aurora SFC modification, the following modules were added: A Knauer K120 pump for needle wash, a 6-port valve for control of needle wash, and a 10 port column switching valve together with a stand alone Gilson column oven.



The modules are controlled via LAN except for the extra valves, where Chemstation uses contact closures (BCD board) for swithing or stepping (column selector) and HyStar uses RS-232. The Gilson oven is off-line (40 °C) and the Knauer pump is running always with recycling. Only one controlling software may be open at the time. In the original abstract it was mentioned that a cable had to be removed/attached manually when switching operation mode. This has meanwhile been overcome.

Figure 1. Configuration



Schematic outline of SFC/LC-MS system. Column capillaries, degasser and extra pumps etc for the MicrOTOF are omitted for clarity



Photo from the lab

Switching and Operation

Switching between SFC and LC-MicrOTOF is controlled by the position of the valve in the G1316A column oven. In practise the valve has different default position in Chemstation and HyStar.

The LC-column is attached to position 2 (in our case) on the column selector and may be placed in either the G1316A or the Gilson 831 oven. During HyStar operation needle washing is done by the Knauer K120 pump controlled by the 6-port valve. In the LC-timetable the washing flow (0.7 ml/min) is directed to the G1316A sampler for 10 sec.

In SFC/Chemstation operation the washing procedure is the default method devised by Aurora. Automated column swithing in e.g. chiral method development is done by including specific methods in the sequence table who's only job is to step the column selector to the wanted position by a number of contact closures. Position 1 in column selector is a shortcut and a total of 9 columns can be used since Chemstation allows 10 steps with contact closures in a method.

Apart from swithing the operation mode, the G1361A column oven is used as a preheater for the mobile phase before injection and before the DAD detector

Conclusions and Future Challenges

- A setup for analytical SFC that utilizes an existing LC-MS system is successfully implemented
- Smooth switching between operation modes without change of tubing has been achieved
- Automated column swithing for SFC method development is implemented
- In the future we will work on a versatile SFC-MS setup based on this configuration