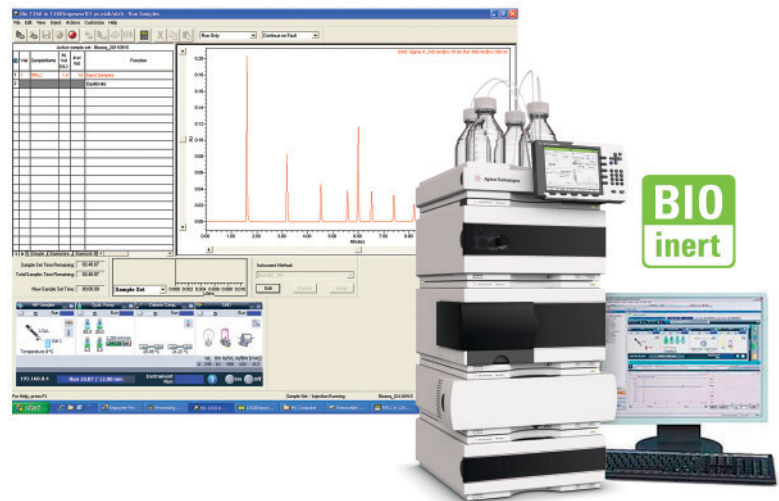# Using the Agilent Instrument Control Framework to control the Agilent 1260 Infinity Bio-inert Quaternary LC through Waters Empower software

Technical Overview

Authors

Sonja Schneider,
Angelika Gratzfeld-Huesgen
Agilent Technologies, Inc.
Waldbronn, Germany

Abstract

The Agilent Instrument Control Framework (ICF) enables other providers of LC data acquisition and processing software to simplify the development of the control of Agilent LC instrumentation. In this Technical Overview, we demonstrate how Agilent ICF facilitates enhanced control of the Agilent 1260 Infinity Bio-Inert Quaternary LC through Waters Empower chromatography data software versions 2 and 3. The combination of Agilent ICF and Waters Empower software provides easy access to advanced features of the Agilent 1260 Infinity Bio-Inert Quaternary LC such as overlapped injections, automated delay volume reduction or acquisition of all eight DAD signals.

Agilent Technologies

Introduction

The Agilent Instrument Control Framework (ICF) is a software component that makes it easier and faster for software providers to implement control of Agilent LC equipment in their chromatographic data systems or workstations [1,2]. Based on new standard instrument drivers from Agilent, ICF eliminates much of the delay and effort of using low-level instrument control codes and the need of software developers to write their own native drivers.

In this Technical Overview we demonstrate:

- Prerequisites to be fulfilled to ensure seamless interaction between Agilent 1260 Infinity Bio-inert Quaternary LC systems, Waters Empower software, and ICF software

- Supported modules and instrument features

- Instrument configuration and method design for the 1260 Infinity Bio-inert Quaternary LC system using Waters Empower software in combination with ICF

- Performance of the 1260 Infinity Bio-inert Quaternary LC system in combination with Waters Empower data acquisition and processing tools

Experimental

The instrument used for the measurement of precision was an Agilent 1260 Infinity Bio-inert Quaternary LC system equipped with the following modules:

- Agilent 1260 Infinity Bio-inert Quaternary Pump (G5611A)

- Agilent 1260 Infinity High Performance Bio-inert Autosampler (G5667A)

- Agilent 1260 Infinity DAD VL (G1315D with bio-inert standard flow cell, 10 mm)

- Agilent 1290 Infinity Thermostatted Column Compartment (G1316C)

Chromatographic conditions for precision measurements

Compounds:	RRLC Checkout sample (p/n 5188-6529) acetanilide, acetophenone, propiophenone, butyrophenone, benzophenone, alerophenone, hexanophenone, heptanophenone, octanophenone
Column:	Agilent ZORBAX Eclipse C18 RRHT, 4.6 × 50 mm, 1.8 µm
Mobile phases:	A = H_2O_{dd} B = acetonitrile
Gradient:	20% to 80% in 8 min, at 8.01 min 20%
Flow rate:	1.2 mL/min
Stop time:	12 min
Column temperature:	30 °C
Injection volume:	1 µL
DAD:	245/10 nm Ref.400/100 nm, 10 Hz
Software :	Empower 2 Build 2154, Installed Service Packs: A-D, Installed Feature Releases: 1-4, with ICF version A.01.02 SP1

Prerequisites for the combination of Empower and ICF

- All Agilent LC modules must have firmware version A.06.32 or B.06.32 or B.06.41 or higher.

- All Agilent LC modules must have RC Net drivers.

- Agilent Infinity LC ICS 1.0.0

- Empower 2, feature release 3 or higher, or Empower 3 software 3.

- Windows XP with service pack 3 or higher.

Results and discussion

With ICF, it is now possible to support Agilent instrument features which were not supported with previous Empower versions, using drivers written by Waters. All features, that are available in the new *On Line* screen, which is added to the Empower screen, are now supported, see Figure 1. Using right mouse-click in one of the module fields gives access to all control, method, and other features of this module. Also, RFID tags can be seen if the cursor is moved over the label pictogram, for example, for the lamp and cell of the DAD module.

For supported modules and functions please refer to the Appendix.

Configuring the Agilent 1260 Infinity Bio-inert Quaternary LC system

The configuration of the Agilent 1260 Infinity Bio-inert Quaternary LC system is described in references 4 and 5.
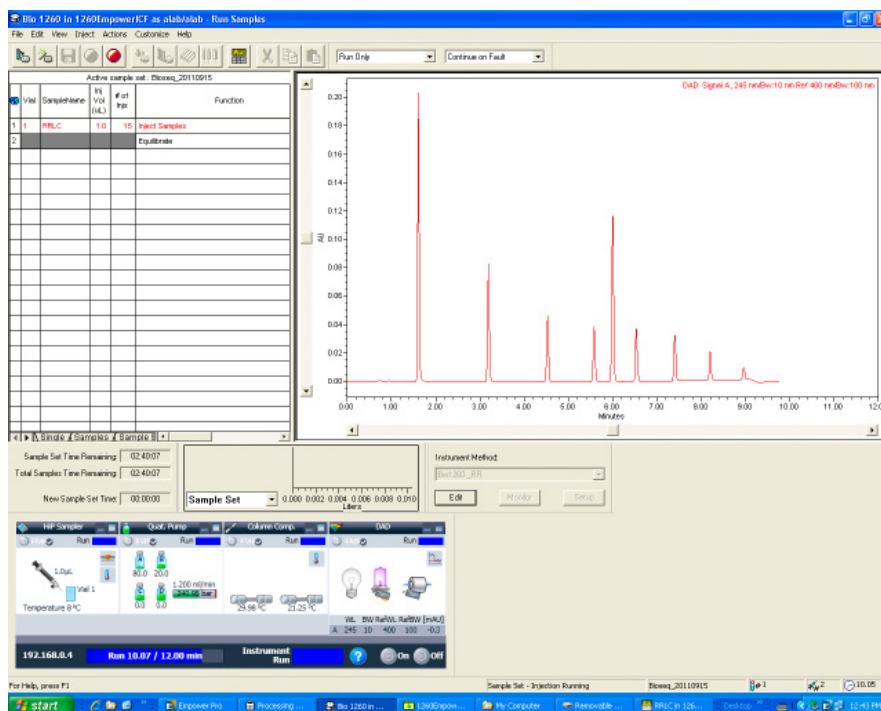

Figure 1
Agilent *Instrument Status* screen under Empower and ICF software, captured while a sequence was running.

Creating an instrument method and a method set

Having configured the instrument, the instrument method and the method set can be created in the Empower *Run sample* screen. The Instrument method is set up via *Edit* method. Figure 2 shows the autosampler screen, where the appropriate parameters are set up. Essentially, all parameters that are available in the Agilent ChemStation are now accessible in Empower.

To use Agilent well/vial plates the dimensions of the plate have to be configured, see Appendix.

Having created the instrument method, it is saved and used to set up a method set. The method set can then be used to create sequences.

Creating a sequence

A sequence is created by filling the sample set table with name of sample, position of vials, number of injections per vial, method set to be used, and other entries.
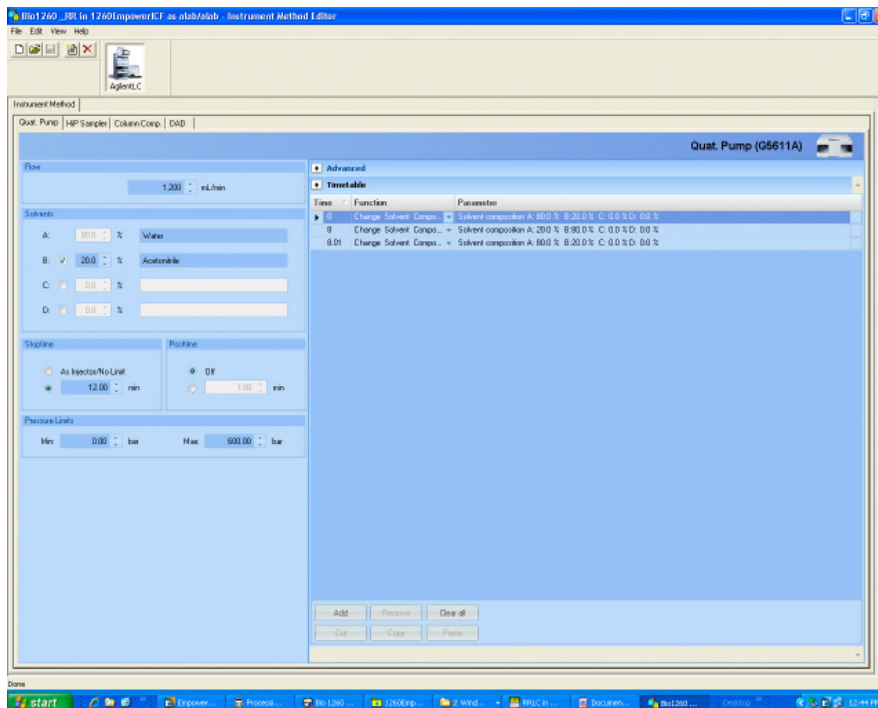

Figure 2
Parameter selection screen for the Agilent 1260 Infinity Bio-inert quaternary LC pump.

Performance of the Agilent LC systems using Waters Empower data processing tools

To demonstrate that the Agilent 1260 Infinity Bio-inert Quaternary LC system fulfills the expected performance, the following tests were done using a RRLC sample:

- Precision of retention time
- Precision of areas

Precision of retention time and areas

In Figure 3, the chromatogram of the RRLC sample is shown. Precision of retention times and areas for a 1 µL injection are combined in Table 1. Data were evaluated using the Empower Component summary report. The precision for the retention times for six consecutive runs is < 0.155% RSD, for the area the precision is < 0.85% RSD, except for the last peak.
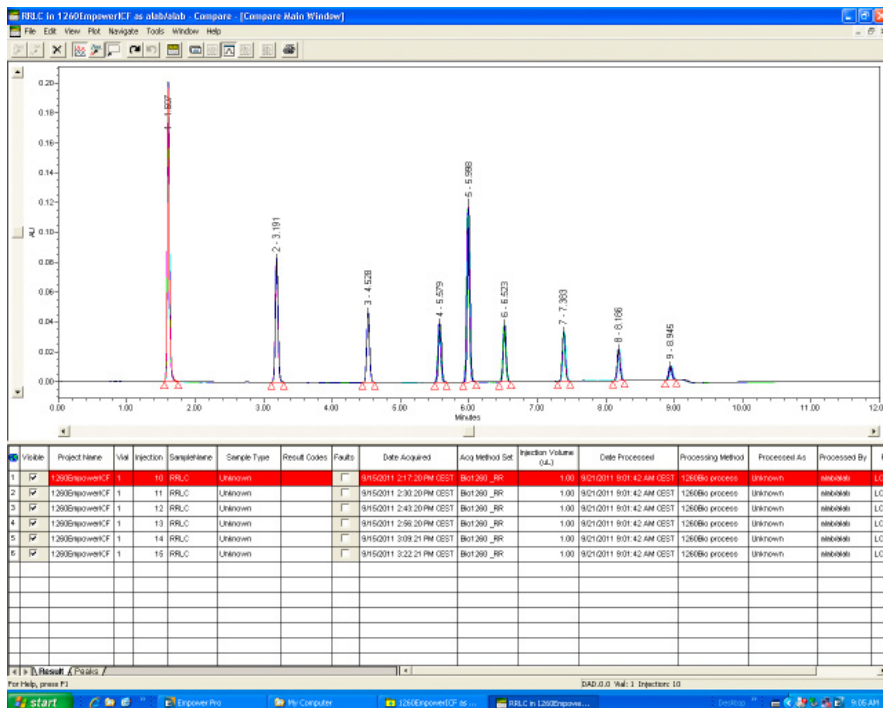

Figure 3
Overlay of six chromatograms of the RRLC sample for evaluation of retention time and area precision.

Peak name	RSD RT (%)	RSD area (%) (1 µL inj. vol)
acetanilide	0.153	0.433
acetophenone	0.066	0.337
propiophenone	0.046	0.225
butyrophenone	0.132	0.818
benzophenone	0.117	0.493
valerophenone	0.081	0.322
hexanophenone	0.087	0.312
heptanophenone	0.099	0.547
octanophenone	0.106	1.546

Table 1
Precision of retention times and areas for six consecutive runs.

Conclusion

The Agilent Instrument Control Framework (ICF) is a software component that makes it easier and faster for software providers to implement control of Agilent liquid chromatography systems in their chromatographic data systems or workstations. In our application example, ICF was used to control the Agilent 1260 Infinity Bio-inert Quaternary LC system in combination with Waters Empower software. The instrument was configured in Empower and data were acquired and processed. The combination of ICF and Empower software facilitates access to all available Agilent instrument features such as external needle wash, overlapped injection and automated delay volume reduction. The Agilent Instrument Status screen is used to set up On Line methods, to switch the system on or off, to equilibrate columns, to view the status of single modules, and to access special features using the Control function available for each Agilent LC module. As expected, the Agilent 1260 Infinity Bio-Inert Quaternary LC system shows the same excellent performance for data acquired and processed using Empower and ICF.

References

1.
"The Agilent Technologies Instrument Control Framework," Technical Overview, Publication number 5990-6504EN, November 2010.

2.
"The Agilent Technologies Instrument Control Framework," Short overview, Publication number 5990-5756EN, June 2010.

3.
"Agilent Infinity LC Instrument Component software Version 1.0 for Empower software," Waters Installation note, Publication number 716003453 Rev.A, August 2011.

4.
"Using the Agilent Instrument Control Framework to control the Agilent 1260 Infinity LC through Waters Empower software Instrument set up and performance," Agilent Publication, Publication number 5990-9092EN, October 2011.

5.
"Using the Agilent Instrument Control Framework to control the Agilent 1260 Infinity Bio-inert Quaternary LC through Waters Empower software Instrument set up and performance," Agilent Publication, Publication number 5990-9093EN, October 2011.

Appendix

Supported and tested Agilent 1260 Infinity Bio-inert Quaternary LC modules are shown in Table 2.

Newly supported and not yet supported functions and instrument features are listed in Agilent Application Note, publication number 5990-9092EN.

Plate dimensions of Agilent plates

The configuration of Agilent plate dimensions is described in Agilent Application Note, publication number 5990-9092EN.

Agilent 1260 Infinity Bio-inert Quaternary LC		Modules tested by Waters	Modules tested by Agilent
Quaternary Pump	G5611A		OK
HiP ALS	G5667A		OK
TCC	G1316C		OK
DAD VL+	G1315C		OK
DAD VL	G1315D		OK
1260 DAD	G4212B		OK
FLD	G1321B	OK	

Table 2
Supported and tested Agilent LC modules.

www.agilent.com/chem

Agilent Technologies