Agilent Instrument Control Framework and Agilent 1290 Infinity Quaternary LC with Waters Empower

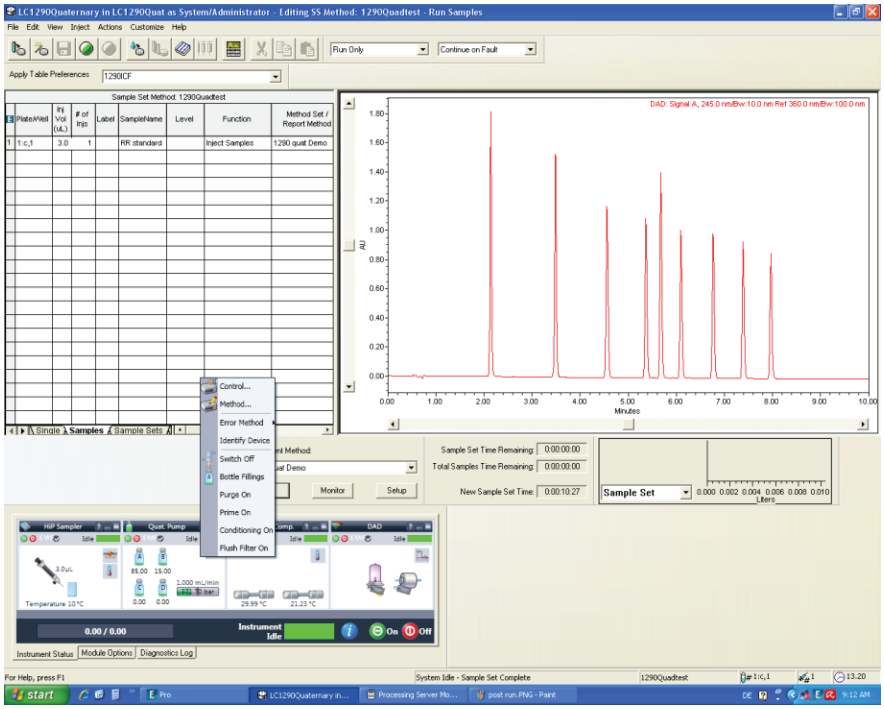
Technical Overview

Author

A. Gratzfeld-Huesgen
Agilent Technologies Inc.
Waldbronn, Germany

Abstract

The Agilent Instrument Control Framework (ICF) enables other LC data acquisition and processing software providers to simplify the development of third-party software control of Agilent LCs. Waters Empower 3, in combination with Agilent ICF, provides enhanced control functions for all Agilent LCs. In this study, the Agilent 1290 Infinity Quaternary LC was connected to the Empower architecture.



Agilent Technologies

Introduction

Instrument control using third-party software is very important to minimize time for software training, and to allow the seamless exchange and comparison of data and results between different departments and different laboratories. In this example, the ICF software, in combination with Waters Empower 3 software, was used to control an Agilent 1290 Infinity Quaternary LC. Data evaluation was done using the Empower 3 processing and reporting routines.

Experimental

The Agilent 1290 Infinity Quaternary LC was equipped with the following modules:

- Agilent 1290 Infinity Quaternary Pump (G4202A)
- Agilent 1290 Infinity Autosampler (G4226A)
- Agilent 1290 Infinity Thermostat (G1330B)
- Agilent 1290 Infinity Thermostatted Column Compartment (G1316C)
- Agilent 1290 Infinity Diode Array Detector (G4212A)

Conditions

Parameter	Value
Column	Agilent Poroshell 120 EC-C18, 4.6 × 50 mm, 2.7 µm (p/n 699975-902)
Compounds	Agilent RRLC checkout sample (p/n 5188-6529) • Acetanilide • Acetophenone • Propiophenone • Butyrophenone • Benzophenone • Valerophenone • Hexanophenone • Heptanophenone • Octanophenone
Mobile phases	Water/acetonitrile
Gradient	15 % to 95 % B in 8 minutes
Flow rate	1 mL/min
Stop time	10 minutes
Post time	3 minutes
Column temperature	30 °C
Injection volume	3 µL
DAD	245/10 nm, ref. 360/100 nm, 20 Hz
Software	Waters Empower 3 (build 3471) with an Agilent ICF version ICF A.01.05 SP11

Results and Discussion

The 1290 Infinity Quaternary LC was configured through the DHCP server in the Empower instrument configuration[2]. After configuration of the instrument, the LC system appeared in the Empower data acquisition screen (see cover picture). For preparation and equilibration of the LC system, the Control functions of the 1290 Infinity Quaternary Pump were used.

After priming and purging of the system, the chromatographic method was set up. Figure 1 shows the method parameter screen of the 1290 Infinity Quaternary Pump as an example.

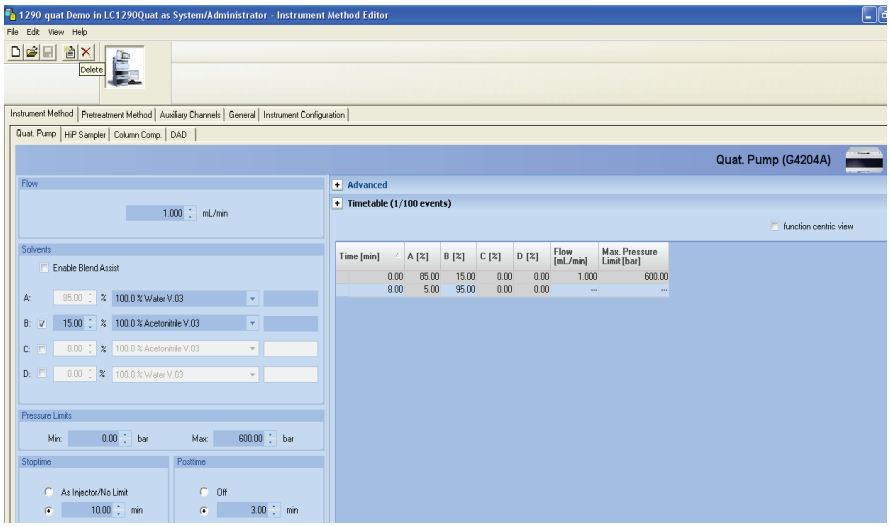
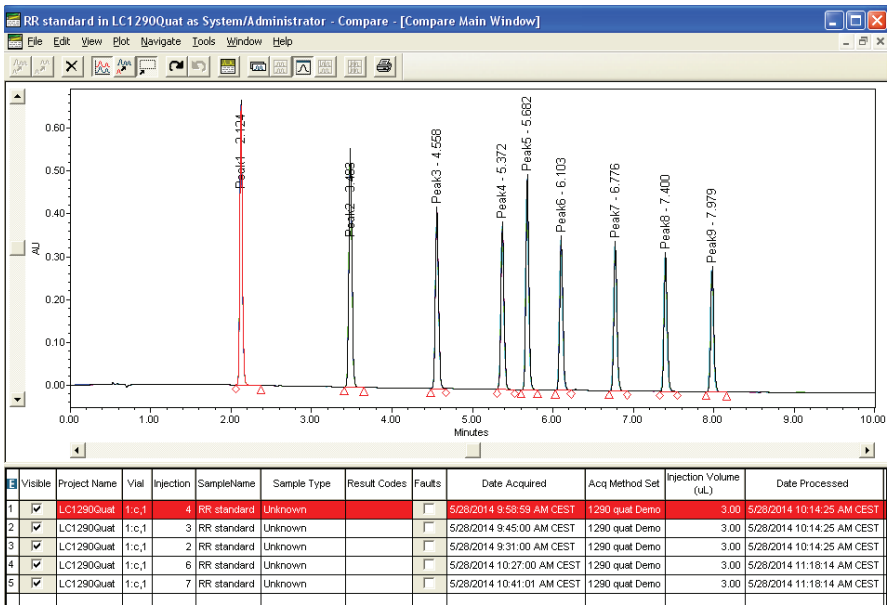


Figure 1. Method parameters screen of the Agilent 1290 Infinity Quaternary Pump in Empower 3.

Having finished the Instrument Method and the Method Set in Empower, a sequence was set up and the data were evaluated using the processing and reporting routines in Empower. The chromatograms were overlaid (Figure 2) using the Compare tool in Empower.



	Visible	Project Name	Vial	Injection	SampleName	Sample Type	Result Codes	Faults	Date Acquired	Acq Method Set	Injection Volume (uL)	Date Processed
1	☑	LC1290Quat	1:c,1	4	RR standard	Unknown		☐	5/28/2014 9:58:59 AM CEST	1290 quat Demo	3.00	5/28/2014 10:14:25 AM CEST
2	☑	LC1290Quat	1:c,1	3	RR standard	Unknown		☐	5/28/2014 9:45:00 AM CEST	1290 quat Demo	3.00	5/28/2014 10:14:25 AM CEST
3	☑	LC1290Quat	1:c,1	2	RR standard	Unknown		☐	5/28/2014 9:31:00 AM CEST	1290 quat Demo	3.00	5/28/2014 10:14:25 AM CEST
4	☑	LC1290Quat	1:c,1	6	RR standard	Unknown		☐	5/28/2014 10:27:00 AM CEST	1290 quat Demo	3.00	5/28/2014 11:18:14 AM CEST
5	☑	LC1290Quat	1:c,1	7	RR standard	Unknown		☐	5/28/2014 10:41:01 AM CEST	1290 quat Demo	3.00	5/28/2014 11:18:14 AM CEST

Figure 2. Overlay of five consecutive runs using Empower 3 software.

The retention time precision and area precision were calculated by accessing the data evaluation and reporting function of Empower 3. The retention time precision was < 0.055 % RSD and area precision < 0.31 % RSD (Figure 3).

Conclusion

The Agilent 1290 Infinity Quaternary LC was configured in Empower 3 and data were acquired and processed. The combination of ICF software and Empower software allowed access to almost all Agilent instrument features such as external needle wash and purging and priming of the pump. The Agilent instrument status screen was used to set up on-line methods, switch the system on or off, equilibrate columns, and view the status of a single module. Special features were accessed using the Control function available for every Agilent LC module. As expected, the 1290 Infinity Quaternary LC showed excellent performance in data acquisition and process using Empower 3 in combination with the ICF software.

Component summary for retention time
Channel:DAD.0.0

	Sample name	Inj.	Channel	Vial	Peak 1	Peak 2	Peak 3	Peak 4
1	RR standard	2	DAD.0.0	1:c, 1	2.12285082	3.47981007	4.55639298	5.36997781
2	RR standard	3	DAD.0.0	1:c, 1	2.12276270	3.48186678	4.55695335	5.37136759
3	RR standard	4	DAD.0.0	1:c, 1	2.12388079	3.48253652	4.55805862	5.37234538
4	RR standard	6	DAD.0.0	1:c, 1	2.12384437	3.48179811	4.55537264	5.36701130
5	RR standard	7	DAD.0.0	1:c, 1	2.12248651	3.48195069	4.55847684	5.37290483
Mean					2.123165	3.481592	4.557051	5.370721
Std. dev.					0.000651	0.001039	0.001256	0.002353
% RSD					0.03066	0.02983	0.02756	0.04381

Component summary for retention time
Channel:DAD.0.0

	Peak 5	Peak 6	Peak 7	Peak 8	Peak 9
1	5.67901987	6.10053615	6.77415326	7.39784536	7.97658206
2	5.68029635	6.10101771	6.77491444	7.39921260	7.97819408
3	5.68162416	6.10287023	6.77576275	7.39979260	7.97913290
4	5.67508248	6.09543765	6.76805823	7.39000441	7.96821641
5	5.68047381	6.10118663	6.77468473	7.39841605	7.97717687
Mean	5.679299	6.100210	6.773515	7.397054	7.975860
Std. dev.	0.002532	0.002809	0.003105	0.004011	0.004383
% RSD	0.04458	0.04605	0.04584	0.05422	0.05495

Figure 3. The Empower Compound Summary report.

References

1. Anon., Agilent Instrument Control Framework (ICF) Update A.01.05. *Waters Corporation*, publication number 716003867, Rev A, **2013**.

2. Huesgen, A. G., Operation of the Agilent 1260 Infinity LC Under Waters Empower Software Using Instrument Control Framework (ICF) - Instrument set up and performance, *Agilent Technologies Application Note*, publication number 5990-9092EN, **2011**.

www.agilent.com/chem/nmr

Published in the USA, September 2, 2014
5991-5105EN

Agilent Technologies