Operating the Agilent 1260 Infinity LC with Dionex Chromeleon software using Instrument Control Framework

Instrument control and performance

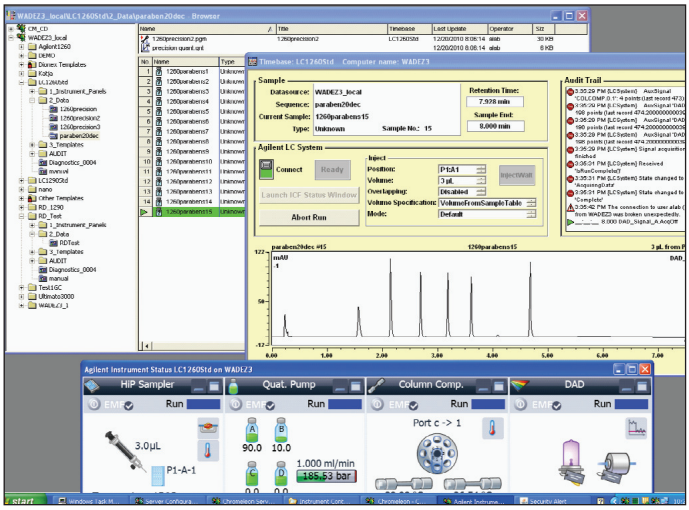
Technical Overview

Author

Angelika Gratzfeld-Huesgen

Agilent Technologies, Inc.

Waldbronn, Germany



Abstract

The Agilent Instrument Control Framework software (ICF) enables third party LC data acquisition and processing software providers to simplify the development of instrument control software for Agilent LCs. Chromeleon 6.80 SR 10 in combination with Agilent ICF A.01.02 provides enhanced control functions for all Agilent 1100 and 1200 Series LC systems.

As an example, the Agilent 1260 Infinity LC system was connected to the new software combination in the Dionex Chromeleon 6.8 architecture. Nearly all Agilent 1260 Infinity LC instrument features are now accessible by combining ICF and Chromeleon software, for example, injector programming, column regeneration with a second pump or acquisition of up to 8 DAD signals.

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Introduction

Recently Agilent Technologies introduced the Instrument Control Framework (ICF), a software component, making it faster and easier for third party software to enable and control Agilent liquid chromatography (LC) systems in chromatographic data systems or workstations[1,2]. Based on the new RC.net standard instrument drivers from Agilent, ICF eliminates much of the delay and effort of using low-level instrument control codes by software developers to program, test and support their own native drivers.

In the following we will demonstrate:

- What prerequisites have to be fulfilled to ensure seamless interaction with Agilent 1260 Infinity LC systems, Dionex Chromeleon 6.8 software and ICF
- Supported features of the Agilent 1260 Infinity LC system
- That the Agilent 1260 Infinity LC system also fulfills the same performance specifications under Dionex Chromeleon 6.8 as under the Agilent CDS or workstations offering.

Experimental

The instrument used was an Agilent 1260 Infinity LC system, equipped with the following modules:

- Agilent 1260 Infinity Quaternary Pump with vacuum degasser
- Agilent 1260 Infinity High Performance Autosampler
- Agilent 1260 Infinity Thermostatted Column Compartment
- Agilent 1260 Infinity Diode-Array Detector SL for 80-Hz operation
- Agilent ZORBAX Poroshell 120 Column packed with 2.7 µm particles

Results and Discussion

The minimum prerequisites needed to run the ICF with Chromeleon 6.8[3] are outlined in the following.

Prerequisites

- To operate Chromeleon with the Agilent ICF, the minimum supported Chromeleon version is Chromeleon 6.80 SR10 and driver update DU10A[4]
- The Instrument Control Framework (ICF) and the Agilent LC Driver Package (version A.01.02) must first be installed on the PC.
- Agilent LC module must have "RC.Net drivers"
- "Before installing the software, ensure all hardware is installed.
- Connect the individual Agilent modules via CAN. Connect the whole instrument to the PC via LAN, use the LAN card in the Agilent module that produces the largest amount of data (DAD > FLD > MWD > VWD > RID)[3]

Supported Agilent LC modules

Using the ICF, it is now possible to support Agilent instrument features which were not supported with previous Chromeleon versions using native Dionex drivers. Primarily all features which are available in the new *Agilent Instrument Status* ON-LINE screen which is added to the known Chromeleon screens, (Figure 1) are now supported. For more information see literature reference 5.

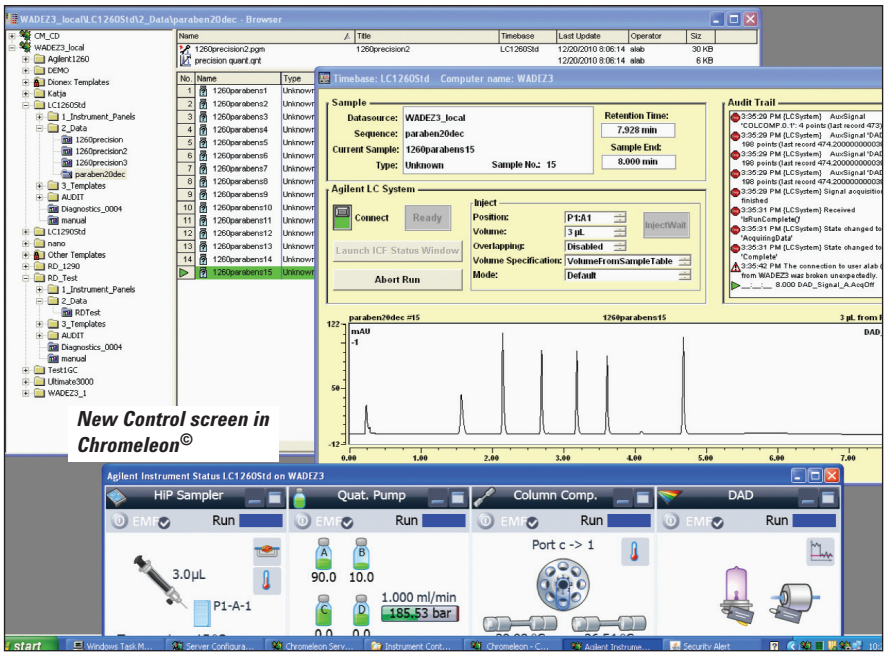


Figure 1
Appearance of the new Agilent Instrument Status screen during a sequence run.

Newly supported instrument features as well as exceptions are summarized in Table 1.

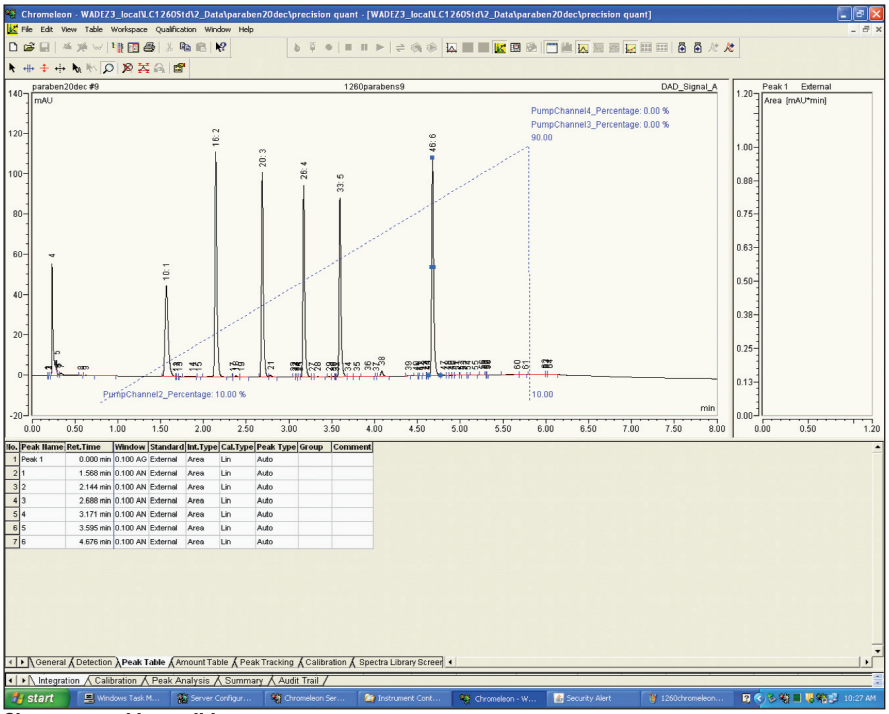
Performance of the Agilent LC systems using Dionex Chromeleon data processing tools

To demonstrate that the Agilent 1260 Infinity LC system fulfills the expected performance the following tests were done:

- Precision of retention time and areas for parabens
- Precision of retention time and areas
  In Figure 2, the chromatogram of a Paraben sample is shown. Precision of retention times and areas for a 3 µL injection are combined in Table 2. Data were evaluated using Chromeleon Peak summary report. The precision for the retention times for six consecutive runs is <0.11% RSD, the area the precision is <0.18% RSD.

The following configurations and tasks are now fully supported by Chromeleon with ICF	Features not yet supported in the Chromeleon version used for this application note
• Second pump for automated column regeneration	• EMF
• Built-in valves in the thermostatted column compartment (TCC)	• Manual injection
• Injector programming, external needle wash	• Fraction collection system
• All 8 signals for the DAD or MWD	• Purge kit (G1373A)
• Creation of additional compressibility curves by the user	• DAD recovery card
• Flexible Cube (G4227A)	• Clustered thermostatted column compartments for column selection
• RF ID tags: lamp and detector cell tags and column tags can be accessed in the “Agilent instrument status” screen by moving the mouse over the label pictograms	• Clustered pump with valves for solvent selection
• Plate numbers must be entered like P1B5 Vial numbers must be entered as: VIAL: 1	• Overlapped injections
	• “Post time” available in the pump set up screen of Agilent pumps

Table 1
Supported instrument features.



Chromatographic conditions

Compounds:	Uracil, Phenol, methyl-, ethyl-, propyl-, butyl- and heptylparaben
Column:	Agilent Poroshell EC C18 120, 4.6 mm × 50 mm, 2.7 µm, p/n 699975-902
Mobile phases:	Water/Acetonitrile
Gradient:	10% to 90% ACN in 5 min, at 5.01 min 10% ACN
Flow rate:	1 mL/min
Stop time:	8 min
Column temperature:	40 °C
Injection volume:	3 µL
DAD:	254/10 nm Ref. 360/100 nm, 20 Hz

Figure 2
Chromatogram of Paraben sample with peak table for evaluation of retention time and area precision.

Conclusion

The Agilent Instrument Control Framework (ICF) is a software component, making it faster and easier for third party software to enable and control Agilent liquid chromatography (LC) systems in chromatographic data systems or workstations. In our application example, the new ICF software was used to control the Agilent 1260 Infinity LC system in combination with Dionex Chromeleon software. The instrument was configured in Chromeleon and data were acquired and processed. The combination of ICF software and the Chromeleon 6.80 SR10 software and driver update DU10A allows accessing nearly all available Agilent instrument features like injector programming, external needle wash, column regeneration with a second pump and more. 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 Infinty LC system shows the same excellent performance for data acquired and processed using Chromeleon and ICF.

Peak number/name	RSD RT (%)	RSD area (%) (3 µL injection volume)
1/Phenol	0.105	0.099
2/Methylparaben	0.064	0.172
3/Ethylparaben	0.094	0.107
4/Propylparaben	0.163	0.151
5/Butylparaben	0.129	0.136
6/Heptylparaben	0.049	0.110

Table 2
Precision of retention times and areas for 6 consecutive runs.

References

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