LC Technical Note
LT184
GL Sciences Inc.

Reduction of Solvent Consumption in HPLC (2020 #2) –Rapid Analysis in Method Development without UHPLC

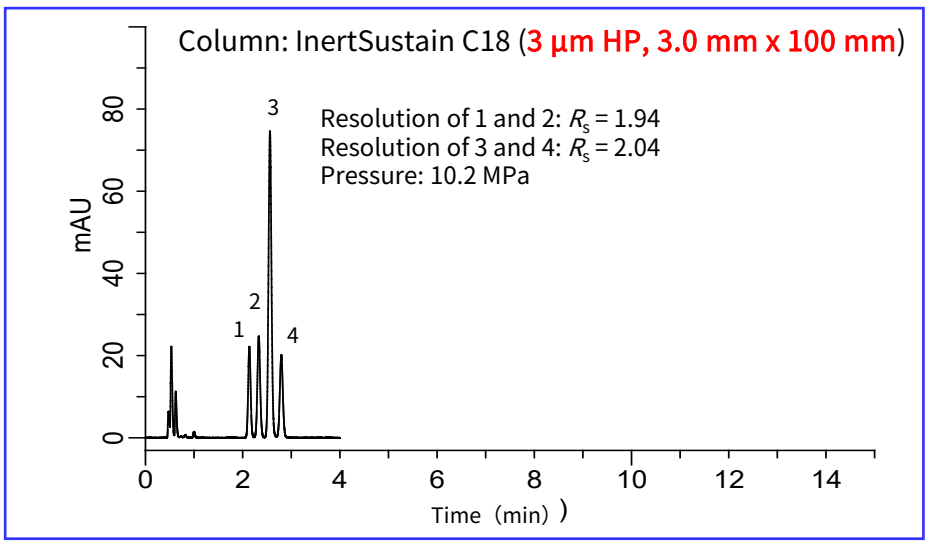
This technical note demonstrates how to reduce analysis time in method development without UHPLC. UHPLC columns packed with sub-2 µm particles generate high pressures above 50 MPa. Therefore, it takes long before the pressure is released for column switching or stop operation. This pressure release takes longer than the analysis itself in some cases. Rapid analysis at a relatively low pressure is possible with 3 µm particles without UHPLC.

(K. Suzuki)

3 µm HP, 3.0 X 100 mm is recommended for Method Development!

4.6 x 150 mm columns are popular for method development. These dimensions require an equilibration time of longer than 15 min and the analysis normally takes 15 - 30 min. On the other hand, the equilibration and analysis of 3 µm, 3.0 mm x 100 mm can be finished in 3 min and 5 min, respectively, because of its wide optimal linear velocity range. 3 µm HP series can be used on conventional HPLC systems, and consecutive analysis to test 10 different conditions can be shortened from a few hours to 1 hour.

Rapid Analysis for Method Development



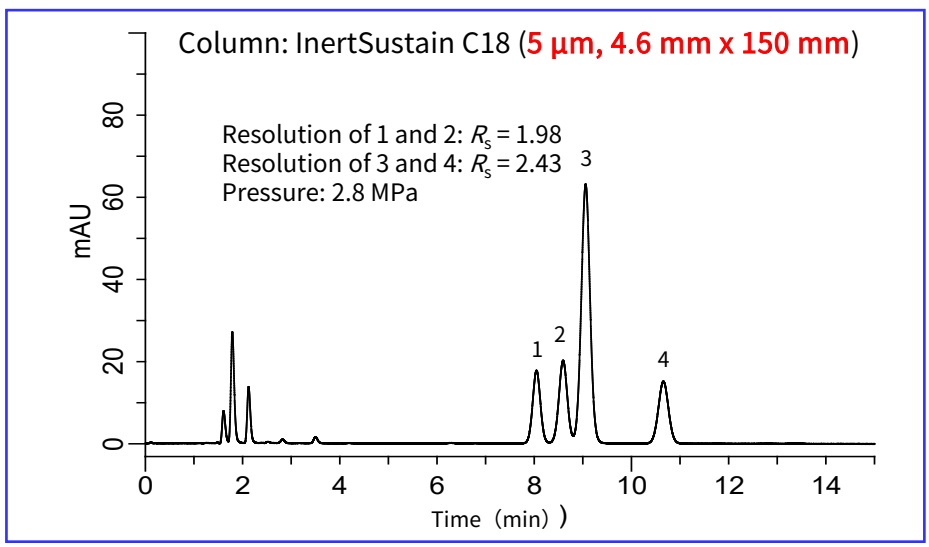
Conditions

System	: GL7700
Column	: InertSustain C18
Mobile phase	: A) CH_3CN B) H_2O A/B = 75/25, v/v
Flow rate	: 1.0 mL/min
Column Temp.	: 40 °C
Detection	: UV 254 nm
Inj. Vol.	: 1.0 µL

1. *n*-Butylbenzene
2. *o*-Terphenyl
3. Triphenylene
4. *n*-Amylbenzene

Easy Method Transfer to Routine Analysis

A disadvantage of columns packed with 3 µm particles over those packed with 5 µm particles is that filter clogging is more likely to happen, which makes the column lifetime shorter. If 5 µm particles are desirable for routine analysis, an isocratic method can be transferred by simply switching to 5 µm 4.6 x 150 mm as shown below.



Same conditions, except for column dimensions.

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● 3 µm HP Series for High Pressures

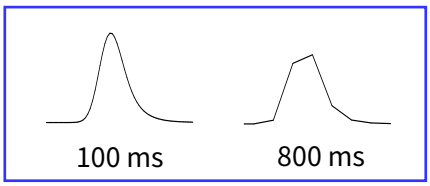
Regular columns packed with 3 µm particles can be easily deteriorated when the flow rate is high, the mobile phase contains a viscous solvent such as methanol, or the column length is long.
For such analysis, 3 µm **HP** (50 MPa max.) is desirable.
Note: the packing material is the same as the regular 3 µm series.

● Notes for Rapid Analysis

Peak distortion may occur when rapid analysis is tested. Note the below points in such a case. Please see LT068 and LT087 for more details. Points 1 and 2 can often be changed on the settings of the detector. Change them by following the manual of your system if necessary.

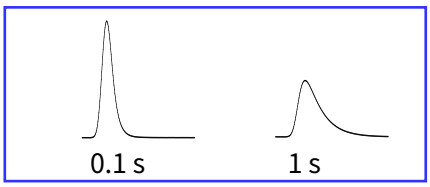
1. Data Acquisition Rate

Data acquisition rate below 100 ms is recommended for analysis shorter than 5 min.



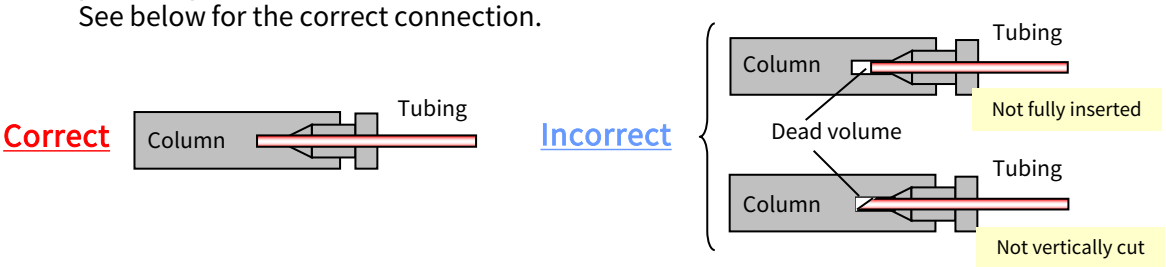
2. Response Time/Time Constant

Shorten the response (e.g. 0.1 s) or set the detector to the rapid analysis mode.



3. Tubing Connection

Incorrect connection between the column and tubing can distort peak shapes.
See below for the correct connection.



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GL Sciences Inc. Japan
22-1 Nishishinjuku 6-chome
Shinjuku-ku, Tokyo
163-1130, Japan

Phone: +81-3-5323-6620
Fax: +81-3-5323-6621
Email: world@gls.co.jp
Web: www.glsciences.com

GL Sciences Inc. USA
4733 Torrance Blvd. Suite 255
Torrance, CA 90503
USA

Phone: +1-310-265-4424
Fax: +1-310-265-4425
Email: info@glsciencesinc.com
Web: www.glsciencesinc.com

GL Sciences B.V.
Dillenburgstraat 7C
5652AM, Eindhoven
The Netherlands

Phone: +31-40-254-9531
Email: info@glsciences.eu
Web: www.glsciences.eu

GL Sciences (Shanghai) Limited
Tower B, Room 2003
Far East International Plaza
No.317 Xianxia Road, Changning District
Shanghai, China 200051

Phone: +86-21-62782272
Email: contact@glsciences.com.cn
Web: www.glsciences.com.cn

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