

Improved Ultra-Fast Separation of 9 Alkylphenones Using the Hitachi LaChromUltra High Speed Liquid Chromatography System with Advance Gradient Function

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When performing a gradient analysis in liquid chromatography the system dwell volume results in a gradient delay, negatively affecting chromatographic performance. Reducing gradient delay is particularly important in ultra high-speed liquid chromatography where shorter and shorter analysis times demand a responsive gradient to realize the full potential of this emerging technology.

The physical dwell volume of a system can be reduced through efficient design and configuration, smaller solvent mixer volumes, a reduced internal diameter of connection tubing, etc. But there is a lower limit, with current system design, to the dwell volume that can be achieved through these measures.

Hitachi's LaChromUltra High-Speed Liquid Chromatography System uniquely solves the gradient delay problem with its Advance Gradient Function. The Advance Gradient Function, based on the software entry of the system's physical dwell volume, eliminates gradient delay effects by synchronizing the timing of the sample injection with the time required for the gradient to reach the column. The result is a reduced analysis time and improved chromatographic performance as demonstrated by the separation of 9 alkylphenones with and without the Advance Gradient Function active.

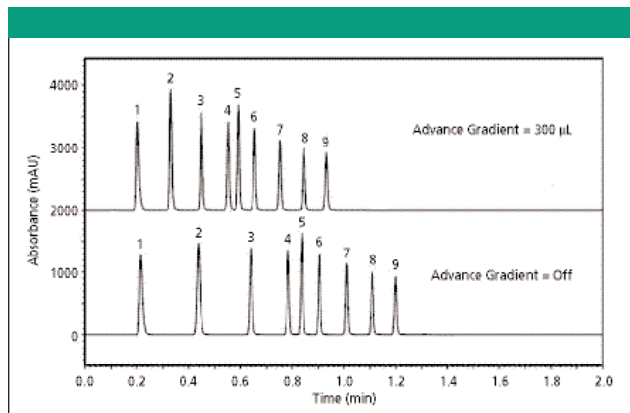


Figure 1: Standard Solutions:
 1 Acetanilide : C₈H₉NO = 135.17
 2 Acetophenone : C₆H₈O = 120.15
 3 Propiophenone : C₉H₁₀O = 134.18
 4 Butyrophenone : C₁₀H₁₂O = 148.21
 5 Benzophenone : C₁₃H₁₀O = 182.22
 6 Valerophenone : C₁₁H₁₄O = 162.23
 7 Hexanophenone : C₁₂H₁₆O = 176.26
 8 Heptanophenone : C₁₃H₁₈O = 190.29
 9 Octanophenone : C₁₄H₂₀O = 204.31

Instrumentation:
 L-2160U (Pump) 3 2, L-2200U (Autosampler), L-2300 (Column Oven),
 L-2400U (UV Detector), EZChrom Elite (Chromato-Integrator)

Reference

Hitachi Technical Note, Sheet No. LCU070004-01, "Measurement of Alkylphenones by Ultrafast LC".

Table I: Conditions

Sample	5 µL standard solutions (100 mg/leach)
Pressure	25 – 50 MPa
Flow rate	1.2 mL/min
Detector	UV 247 nm
Packing Material	Hitachi LaChromUltra C18 (2 µm)
Temperature	40 °C
Column size	2.0 mm I.D. x 50 mm

Table II: Gradient program

Time (min)	% H ₂ O	% CH ₃ CN
0	65	35
1.0	5	95
1.1	65	35
2.0	65	35

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