

Application News

Ultra High Performance Liquid Chromatography

SSI LC 006

Evaluation of Kinetex Column Peak Capacity Using the Shimadzu Nexera UHPLC System

Introduction

Peak capacity is a commonly used metric of separation power that reflects the overall performance of the column and system. While peak capacity values can be increased with longer runtimes, today's environment requires high resolution chromatography in a short amount of time. Both small particle and core-shell columns have shown the ability to deliver high resolution performance in a short period of time. A 24 second gradient runtime was evaluated with a sub 2 micron core shell particle column on the Nexera UHPLC system.

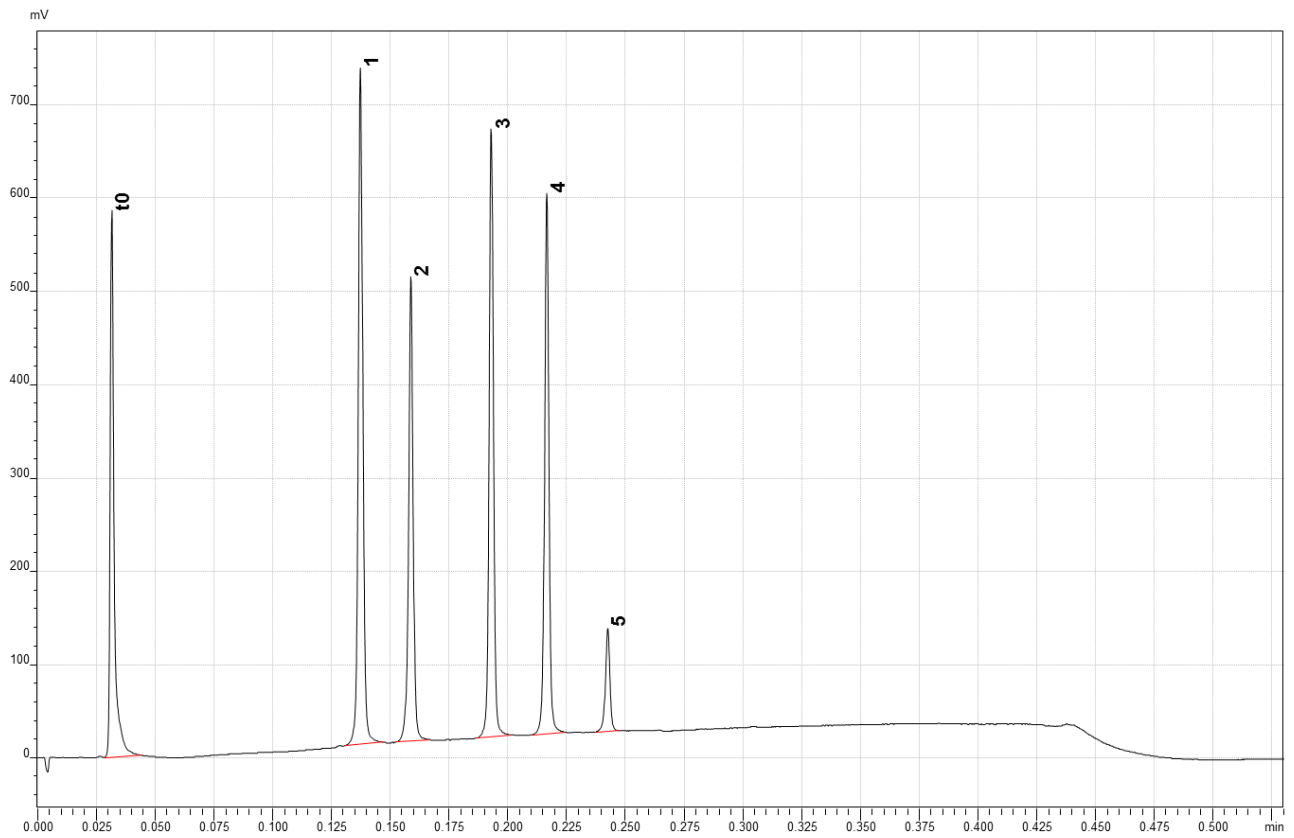
Instrumentation

Instrument configuration includes two LC-30AD pumps, DGU-20A5 degasser, 20 uL MIRC mixer, SIL-30AC autosampler, CTO-30A column oven, SPD-20A UV detector, and CBM-20A system controller. A Phenomenex Kinetex 1.7 um 2 x 30mm XB-C18 column was tested.

Method Conditions

Shimadzu Nexera system
Kinetex 2.1 x 30mm XB-C18 1.7 um
Column temp: 80°C
Flow: 3.0 mL/min
A: Water B: Acetonitrile
GE: 2 to 98%B (0.40min), stop (0.53min)
Inj: 2 uL, 5 uL loop installed
Micro cell, 100Hz, no filter

Chromatogram



Sample mix:

t0: Uracil, 1: Methyl paraben, 2: Acetophenone, 3: Propyl paraben, 4: Butylparaben, 5: Naphthalene

Results

Peak#	Name	Ret. Time (min)	Tailing F.	NTP(USP2)	HETP(USP2)	Resolution(USP2)
1	t0	0.031				
2	1	0.137	1.05	26988	5.558	36.2
3	2	0.159	0.959	34882	4.3	6.3
4	3	0.193	1.03	60222	2.491	10.4
5	4	0.216	1.014	71920	2.086	7.4
6	5	0.242	0.94	78755	1.905	7.8

Peak capacity

peak	peak width (50%H)	peak capacity
t0	0.088 sec	
1	0.118 sec	204
2	0.120 sec	201
3	0.111 sec	217
4	0.114 sec	212
5	0.122 sec	198

Summary

Peak capacities of 200 could be obtained with a 24 second gradient runtime for the compounds that were tested. All compounds were eluted from the column in less than 15 seconds. These results demonstrate the combined benefits of high column efficiency and system performance.