

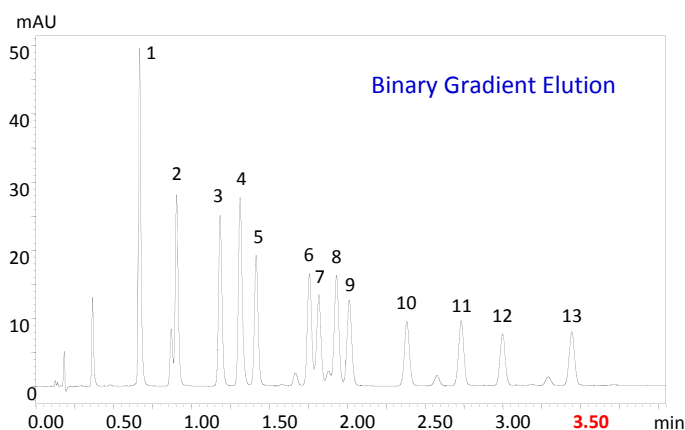
Nexera Application Data Sheet No.13

Ultrafast Analysis of Aldehydes and Ketones

Aldehydes and ketones in the environment can be analyzed using HPLC by derivatizing them with 2,4-dinitrophenylhydrazine (2,4-DNPH). For multicomponent separation of aldehyde/ketone DNPH derivatives, reverse-phase gradient elution is generally used. Nexera enables stable ultrafast gradient elution through accurate solution delivery and the use of a high-efficiency gradient mixer. This document introduces an example of ultrafast analysis performed on 13 aldehyde/ketone DNPH derivatives by gradient elution using Nexera and a Phenomenex Kinetex C18 column (particle size 2.6 μm , a core-shell column where a 0.35 μm porous membrane is combined with a 1.9 μm solid core).

Batch analysis of 13 aldehyde/ketone DNPH derivatives by binary high-pressure gradient elution

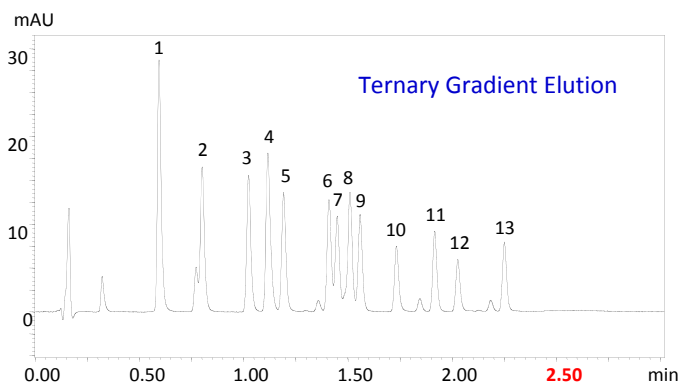
A batch analysis was performed on standard mixtures (1 $\mu\text{g}/\text{mL}$ and 5 μL injection each) by binary high-pressure gradient elution with water/THF mixture and acetonitrile. In this analysis, the repeatability ($n = 6$, %RSD) of the retention time and peak area of formaldehyde-DNPH derivatives were 0.087 % and 0.16 % respectively, showing Nexera's high-accuracy gradient performance.



Column	: Phenomenex Kinetex 2.6 μm C18 100 Å (50 mmL x 3.0 mmI.D., 2.6 μm)
Mobile phase	: A: Water/THF=8/2 B: Acetonitrile
Gradient	: B 20 % (0 min) $\rightarrow$ 50 % (4 min)
Flow rate	: 1.5 mL/min (Mixer 180 μL)
Column temp.	: 50 $^{\circ}\text{C}$
Injection volume	: 5 μL
Detection	: UV 360 nm
Flow cell	: Semi-micro cell

Batch analysis of 13 aldehyde/ketone DNPH derivatives by ternary high-pressure gradient elution

Nexera's modular design enables various systems to be configured, such as a high-pressure gradient elution system with up to three solutions or a low-pressure gradient elution system with up to four solutions. Below is an example where standard mixtures (1 $\mu\text{g}/\text{mL}$ and 2 μL injection each) were efficiently analyzed in a shorter time using ternary high-pressure gradient elution.



Column	: Phenomenex Kinetex 2.6 μm C18 100 Å (50 mmL x 2.0 mmI.D., 2.6 μm)
Mobile phase	: A: Water B: Acetonitrile C: THF
Gradient	: B 20 % (0 min) $\rightarrow$ 50 % (2.0-2.4 min) C 15 % (0 min) $\rightarrow$ 10 % (2.0-2.4 min)
Flow rate	: 0.9 mL/min (Mixer 180 μL)
Column temp.	: 50 $^{\circ}\text{C}$
Injection volume	: 2 μL
Detection	: UV 360 nm
Flow cell	: Semi-micro cell

Peaks:

1. Formaldehyde, 2. Acetaldehyde, 3. Acetone, 4. Acrolein, 5. Propionaldehyde, 6. Crotonaldehyde, 7. 2-Butanone, 8. Methacrolein, 9. *n*-Butyraldehyde, 10. Benzaldehyde, 11. Valeraldehyde, 12. *m*-Tolualdehyde, 13. Hexaldehyde (as their 2,4-DNPH derivatives)