Application Note

820023H

Analysis of Aldehydes using Post-column Derivatization by High Performance Liquid Chromatography

Introduction

It is becoming a big concern that aldehydes such as the formaldehyde and acetaldehyde as an environmental pollutant may contaminate environment such as the atmosphere, lakes and marshes, reservoirs, and rivers. Therefore, it is an object of various regulations like Air Pollution Control Law, Water Supply Law, and Offensive Odor Control Law, etc. in this country. As a method to measure aldehydes using HPLC, the pre-column derivatization method by 2,4- DNPH is well known, while the pretreatment such as sample collection, condensation and extraction is necessary. JASCO has introduced so far the analysis of formaldehyde and acetaldehyde by the post column fluorescence derivatization method using 1,3- Cyclohexanedione as a derivatizing reagent, which doesn't need such pretreatment like condensation etc.

Here, in addition to two components, five components including propyl aldehyde, butyraldehyde, and valeraldehyde were analyzed simultaneously.

Keyword : Aldehydes, 1,3-Cyclohexanedione, Post column derivatization method, Shodex RSpak KC-811 6E, Fluorescence detector

Experimental

Equipment

Eluent pump:	PU-2080
Reagent pump:	PU-2085
Degasser:	DG-2080-53
Autosampler:	AS-2057
Column oven:	CO-2060
Reaction oven:	RO-2061
Detector:	FP-2020

Conditions

Column:	Shodex RSpak KC-811 6E (6.0 mmID x 250 mmL)
Eluent:	3 mM Perchloric acid
Flow rate:	1.0 mL/min
Reagent:	1,3-Cyclohexanedione in ammonium acetate buffer
Reagent flow rate:	0.4 mL/min
Column temp.:	60ºC
Reaction temp.:	120ºC
Wavelength:	Ex. 366 nm, Em. 440 nm, Gain x10
Injection volume:	100 µL
Standard sample:	Formaldehyde, Acetaldehyde, Propylaldehyde, Butylaldehyde, Valeraldehyde 0.1 mg/L each

Result

In Fig. 1, 1,3-Cyclohexanedione reaction formula of post column derivatization method is shown and Fig. 2 illustrates Flow system diagram.

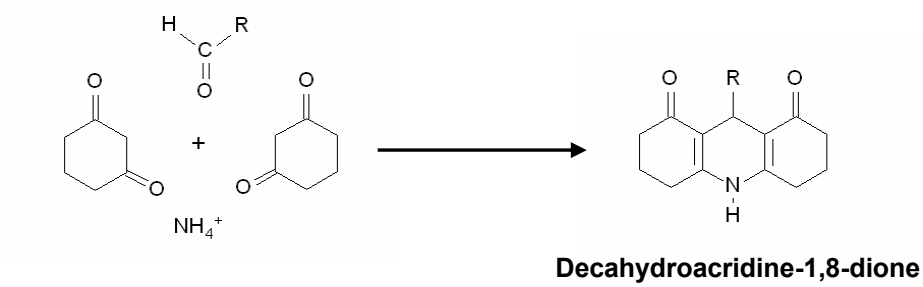
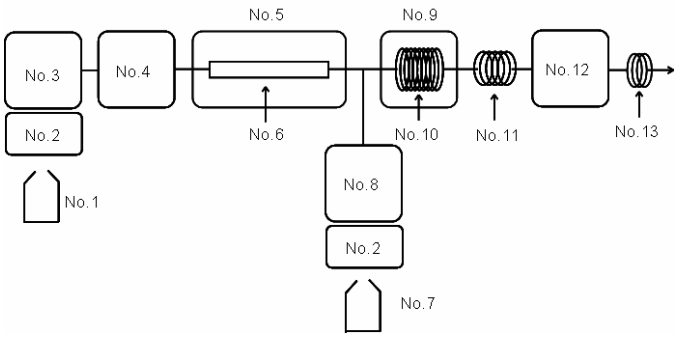


Fig. 1. 1,3-Cyclohexanedione reaction formula of post column derivatization method



No.1 : Eluent
No.2 : Degasser (DG-2080-53)
No.3 : Pump for eluent (PU-2080)
No.4 : Autosampler (AS-2057)
No.5 : Column oven (CO-2060)
No.6 : Column (Shodex RSpak KC-811 6E)
No.7 : Reagent
No.8 : Pump for reagent (PU-2085)
No.9 : Reaction oven (RO-2061)
No.10: Reaction coil
No.11: Cooling coil
No.12: Fluorescence detector (FP-2020)
No.13: Backpressure coil

Fig. 2. Flow system diagram

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Fig. 3 shows the chromatogram of 5 components of Aldehydes. As shown, 5 components were clearly separated within 16 min. The minimum detectable amount(in case of S/N=3) of each component is as below.

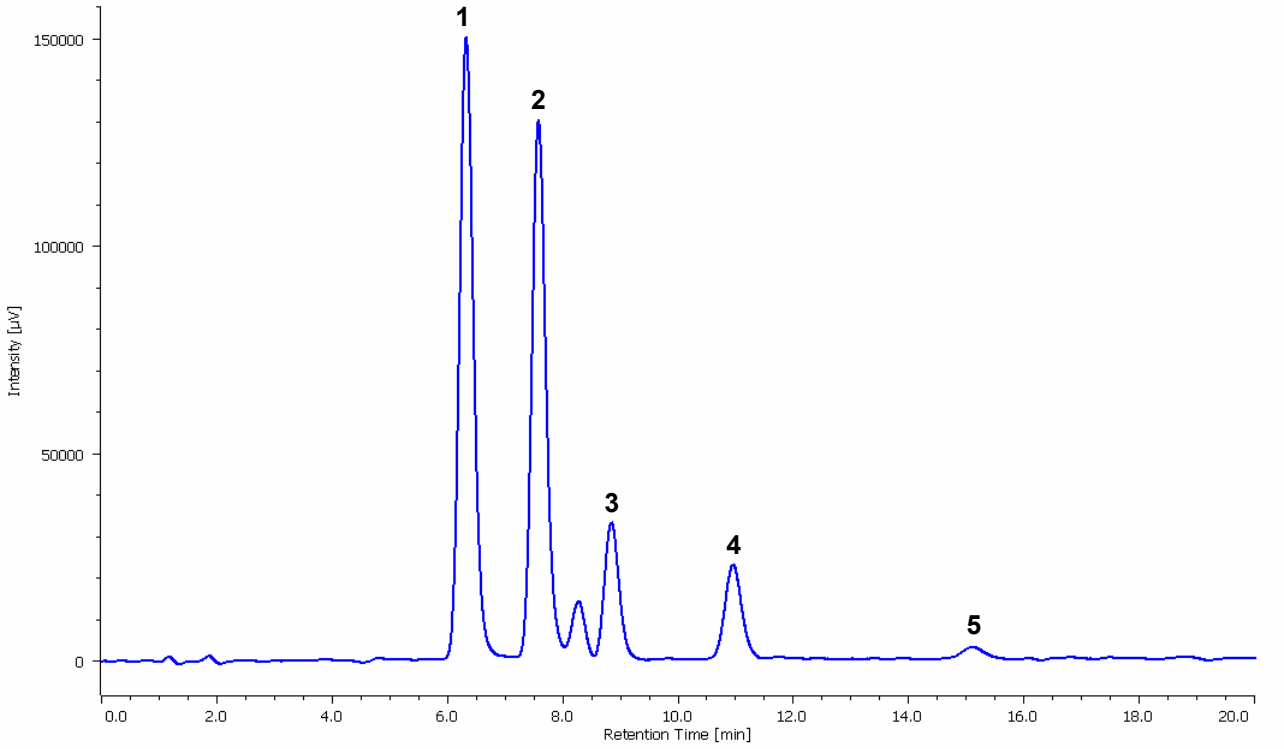

Fig. 3. Chromatogram of five components of aldehydes
Minimum detectable amount of each component
1: Formaldehyde (0.091 ng), 2: Acetaldehyde (0.105 ng), 3: Propylaldehyde (0.418 ng), 4: Butylaldehyde (0.593 ng), 5: Valeraldehyde (4.53 ng)

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