

Application
Data Sheet

No. 14

GC
Gas Chromatograph

Simultaneous Analysis of Lower Aldehydes That Do Not Require Derivatization

The conventional method used to simultaneously analyze lower aldehydes by gas chromatography (GC) involves reacting them with a derivatizing agent before analysis in order to increase stability and detection sensitivity. However, derivatization can be difficult for some sample compositions or coexisting components. Therefore, there has been demand for an alternate method that enables direct, high-sensitivity measurement of lower aldehydes. Barrier discharge ionization detectors (BID) uses a revolutionary plasma technology to detect all compounds except He and Ne. Because BID is able to detect lower aldehydes, including formaldehyde, without derivatizing the aldehydes, they are especially helpful for analyzing aldehydes in samples such as resins, chemical products, and water.

This Data Sheet introduces the analyzing lower aldehydes in water using a Shimadzu HS-20 headspace sampler and a Shimadzu Tracera High Sensitivity Gas Chromatograph System (GC-BID).

Analysis Results

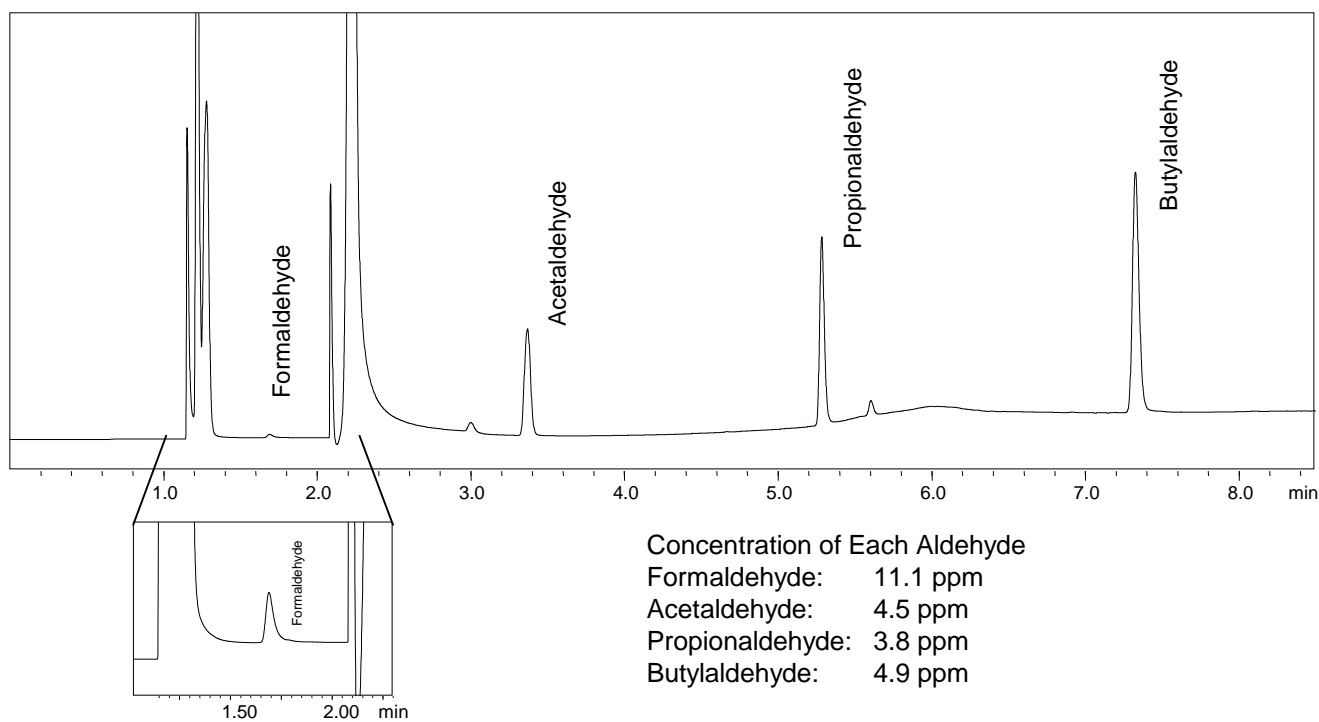


Fig. 1: Chromatogram of Aldehydes in Water

Table 1: Repeatability of Area Values ($\mu V \times sec$)

	1	2	3	4	5	Ave.	RSD %
Formaldehyde	24803	25291	25133	25219	25335	25156	0.84
Acetaldehyde	745944	736335	750353	760809	760429	750774	1.37
Propionaldehyde	1000860	975441	1005373	1026178	1027918	1007154	2.13
Butylaldehyde	1771850	1695015	1771917	1815825	1807684	1772458	2.69

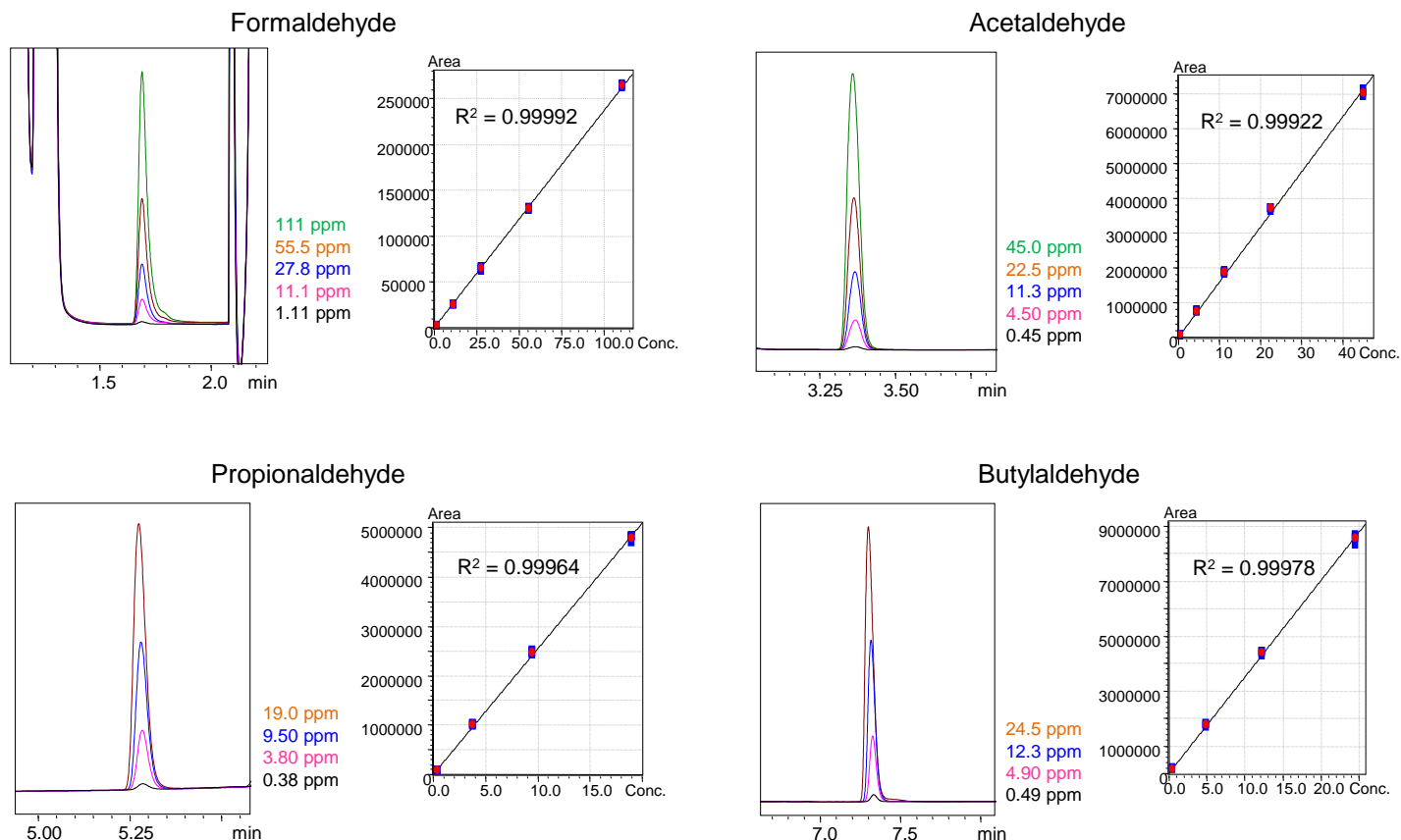


Fig. 2: Linearity of Respective Components

Instruments Used and Analysis Conditions

Gas Chromatograph: Tracera (GC-2010 Plus A + BID-2010 Plus)
 Headspace Sampler: HS-20
 Software: LabSolutions LC/GC

HS-20

Oven temp.:	80 °C	Vial agitation:	Off
Vial warming time:	30 min.	Vial pressurization pressure:	77 kPa
Vial pressurization time:	1 min.	Load time:	0.5 min.
Injection time:	1 min.	Needle flush time:	8 min.
Sample line temp.:	150 °C	Transfer line temp.:	140 °C
Vial volume:	20 mL	Sample loop volume:	1 mL

Tracera

Column:	Rt®-U-BOND (0.53 mm I.D. × 30 m, d.f. 20 μm)		
	Note: A 2.5 m × 0.53 mm RESTEK brand particle trap is connected via an SGE SilTite™ μ-Union.		
Column temp.:	100 °C – 5 °C/min – 110 °C – 20 °C/min – 180 °C (3 min), Total 8.5 min		
Carrier gas:	He (99.9999 %)		
Carrier gas control:	Constant linear velocity (55 cm/min)	Split ratio:	1:3
Detector temp.:	190 °C	Plasma gas:	Helium at 50 mL/min

Note: 3mL of sample solution and 1g of sodium chloride was sealed in a vial, and completely dissolved sodium chloride before analyzing the sample.