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Application Data Sheet

No.34

LC
Liquid Chromatograph

Simultaneous Analysis of Formic Acid and Formaldehyde

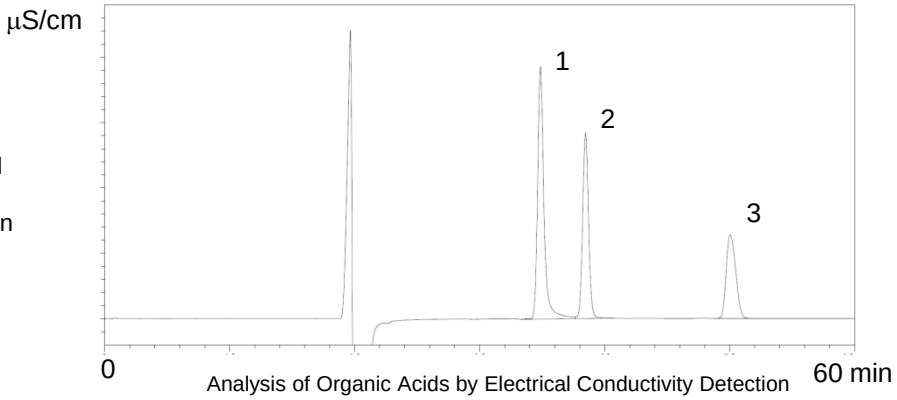
Artificial photosynthesis uses photocatalytic reactions for water splitting and carbon dioxide reduction to create hydrogen, oxygen, carbon monoxide, and formic acid. Of these reaction products, hydrogen, oxygen, and carbon monoxide escape from the sample solution as gases. However, formic acid remains in the sample together with added components, such as electron donors, and byproducts, such as formaldehyde. To measure the amount of formic acid created, it is necessary to separate it from these components. This Data Sheet highlights the pH-buffered electroconductivity method offered by the Shimadzu Organic Acid Analysis System to analyze formic acid, together with a refractive index detector for the simultaneous analysis of formaldehyde.

Simultaneous Analysis of Formic Acid and Formaldehyde

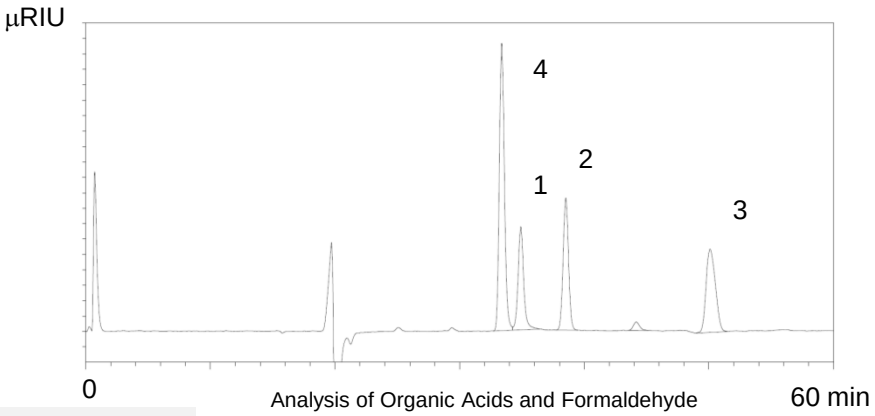
Shimadzu's Organic Acid Analysis System pH-buffered electroconductivity method offers excellent separation and selectivity. However, as formic acid and formaldehyde overlap in the Shim-pack SCR-102H ion-exclusion column used in this system, a YMC Hydrosphere C18 reverse-phase column was added to improve separation.

In addition, as formaldehyde cannot be detected by an electrical conductivity detector, a refractive index detector was added in series.

The diagrams to the right show the analysis of several hundred ppm standard samples of each component.



Analysis of Organic Acids by Electrical Conductivity Detection



Analysis of Organic Acids and Formaldehyde by Refractive Index Detection

Columns:	YMC Hydrosphere C18 (150 mmL. × 4.6 mmI.D.)
	Shim-pack SCR-102H (300 mmL. × 8.0 mmI.D.) × 2
Mobile phase:	5 mmol/L Perchloric Acid
Flow rate:	0.6 mL/min
Column temp.:	40 °C
Reaction reagent:	5 mmol/L Perchloric Acid
	20 mmol/L Bis-Tris
	0.1 mmol/L EDTA-4H
Flow rate:	0.6 mL/min
Reaction temp.:	40 °C
Detections:	Electrical Conductivity, Reflective Index
Injection volume:	100 μL

Peaks :
1. Formic Acid
2. Acetic Acid
3. Propionic Acid
4. Formaldehyde

First Edition: May, 2013

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