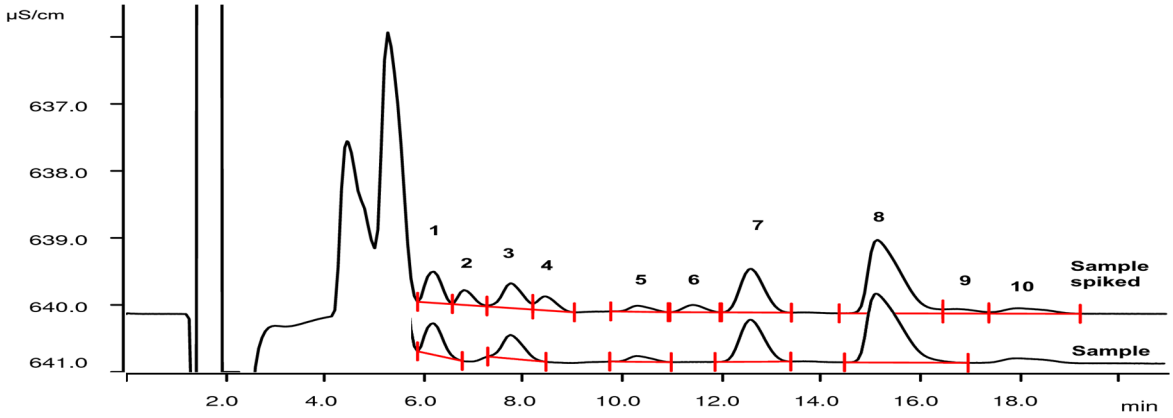
IC Application Note C–187

UOP 939-96: Basic Nitrogen in LPG by Ion Chromatography

Determination of amines in an acetic acid scrubber solution (according to UOP 936-95) applying non-suppressed cation chromatography.



Cation chromatograms of a scrubber solution without spike (chromatogram partially shown, bottom) and with a spike of 0.5 mg/L amines (DMA [2], DEA [4], DPA [6], and DBA [9]). The recovery of the spikes was between 92–118%.

Natural liquefied petroleum gas (LPG) is a mixture of hydrocarbon gases (e.g. propane and butane), but it also contains acidic contaminants (e.g. carbon dioxide or hydrogen sulfide). These gases need to be scrubbed from the petroleum gas as they are highly corrosive. This purification step, referred to as «sweetening», is often performed by using alkaline amine solutions. Thereby the amine solution absorbs the acidic gases, while the raw LPG is neutralized. To guarantee that amine residues in the sweetened gas do not influence the gas quality, the amines in the final LPG are determined by scrubbing the gas with acetic acid as described in UOP 936-96. The recent method enables the quantification of the amines dimethylamine (DMA), diethylamine (DEA), dipropylamine (DPA), and dibutylamine (DBA) by separation from standard cations.

Results

	Cation	Result [mg/L]	Recovery [%]
2	Dimethylamine	0.57	114
4	Diethylamine	0.58	116
6	Dipropylamine	0.46	92
9	Dibutylamine	0.59	118

Peaks 1, 3, 5, 6, and 7 correspond to matrix components (mainly inorganic cations). These components are not identified.

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Sample

Acetic acid scrubber solution

Sample preparation

According to UOP 936-95 (as requested in UOP 939-96)

Cation columns

Metrosep C 4 - 150/4.0	6.1050.420
Metrosep C 4 Guard/4.0	6.1050.500

Solutions

Eluent	1.7 mmol/L nitric acid 3.0% acetone

Instrumentation

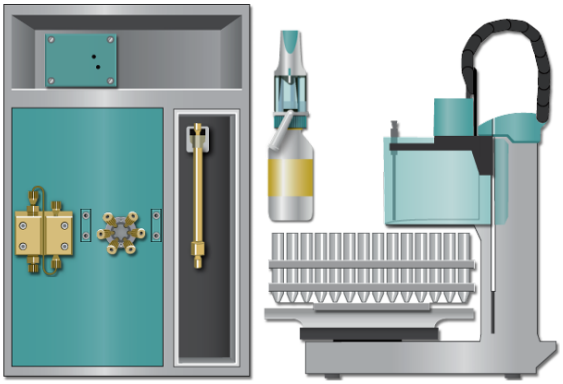
940 Professional IC Vario ONE	2.940.1100
IC Conductivity Detector	2.850.9010
858 Professional Sample Processor	2.858.0010
800 Dosino	2.800.0010
IC equipment: MiPT	6.5330.180

Analysis

Direct conductivity detection

Parameters

Flow rate	0.9 mL/min
Injection volume	50 µL
P_{max} (cations)	25 MPa
Column temperature	30 °C
Recording time	19 min



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