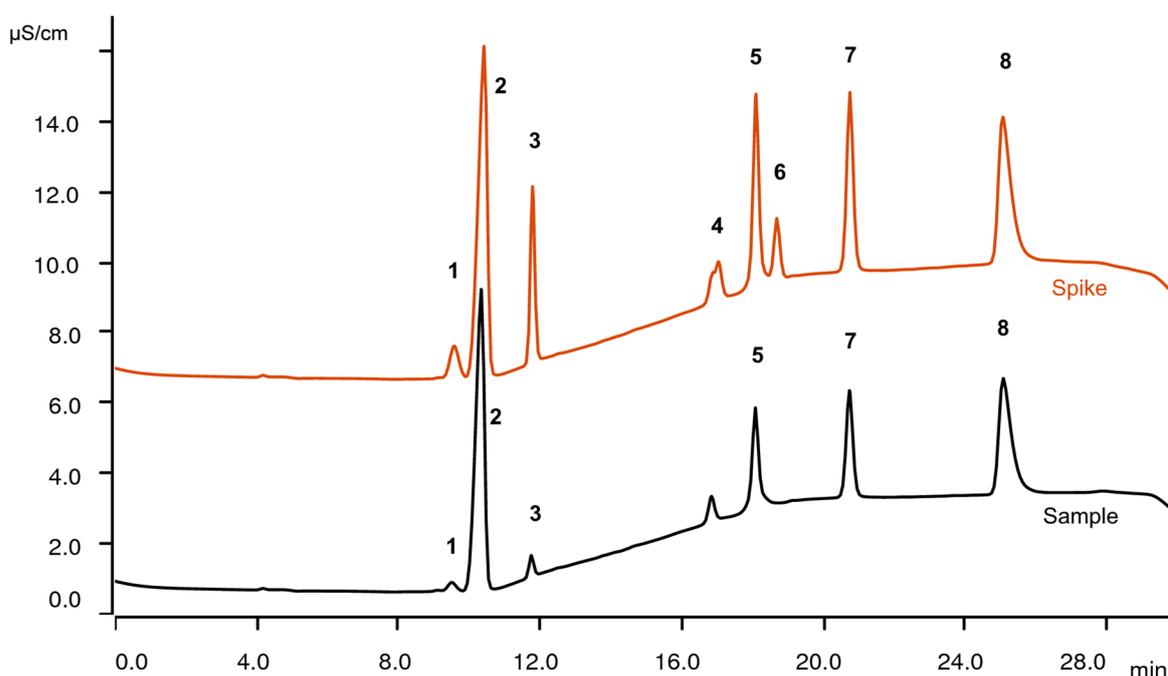


Heat-stable salts in monoethanolamine (MEA) for gas sweetening

Eight components in heat stable salts are separated applying a high-pressure gradient on a Metrosep A Supp 5 - 250/4.0 column



Chromatograms of MEA (diluted 1:100), injected directly (black) and spiked (red) with 5 mg/L for each of the ions.

In the petrochemical industry, natural gas is processed to remove contaminants and meet product specifications. Process contaminants include acidic gases such as hydrogen sulfide and carbon dioxide, which can corrode costly refinery equipment downstream. Typically, the acidic gases are removed via alkanolamine treatment using monoethanolamine (MEA) or methyldiethanolamine (MDEA). The amine solutions absorb the acidic gases, and then the amine compounds are removed from the natural gas.

In addition to the acidic gases, heat stable salts (HSS) that remain in the natural gas are also corrosive to the treatment plants. These are also removed via gas sweetening and need to be determined in the used gas sweetening amine solution. Some typical heat stable salts of interest include acetate (1), formate (2), chloride (3), phosphate (4), sulfate (5), oxalate (6), thiosulfate (7), and thiocyanate (8).

Sample

Spiked monoethanolamine (MEA).

Sample preparation

The MEA sample is diluted 1:100 with ultrapure water.

Columns

Metrosep A Supp 5 - 250/4.6	6.1006.530
Metrosep A Supp 5 Guard/4.0	6.1006.500

Solutions

Eluent A	15 mmol/L sodium carbonate 15 mmol/L sodium hydrogen carbonate 15% acetone
Eluent B	15% acetone
Regenerant	500 mmol/L sulfuric acid 15% acetone
Suppressor rinsing	15% acetone

Instrumentation

940 Professional IC Vario One/SeS/PP/HPG	2.940.1540
IC Conductivity Detector	2.850.9010
858 Professional Sample Processor	2.858.0020
800 Dosino for Dosino regeneration	2.800.0010
IC equipment: Dosino regeneration	6.5330.190
HP Gradient Mixing Coil	6.2758.000
MSM-HC Rotor A	6.2842.000

Parameters

Flow rate	0.7 mL/min
Injection volume	10 µL
P _{max}	15 MPa
Column temperature	30 °C
Recording time	30 min

Analysis

Conductivity after sequential suppression

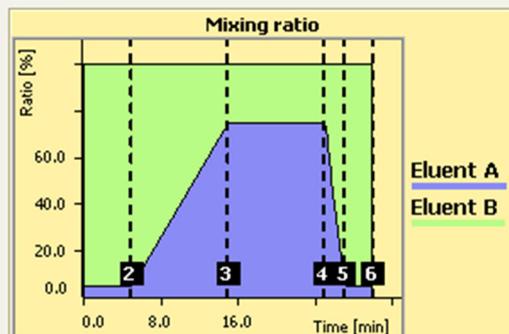


Results

MEA 1:100 diluted	Conc. [mg/kg]	RSD [%]	Recovery [%]
Acetate	1.35	0.4	102
Formate	31.1	0.0	99
Chloride	0.78	0.0	98
Phosphate	<0.1	-	101
Sulfate	5.39	2.2	91
Oxalate	<0.1	-	99
Thiosulfate	8.37	0.7	99
Thiocyanate	19.01	0.5	107

Gradient

	Time [min]	Eluent A [%]	Eluent B [%]	Curve	Flow
▶ 1	Start	5	95		0.7
2	5.0	5	95	Linear	0.7
3	15.0	75	25	Linear	0.7
4	25.0	75	25	Linear	0.7
5	27.0	5	95	Linear	0.7
6	30.0	5	95	Linear	0.7



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