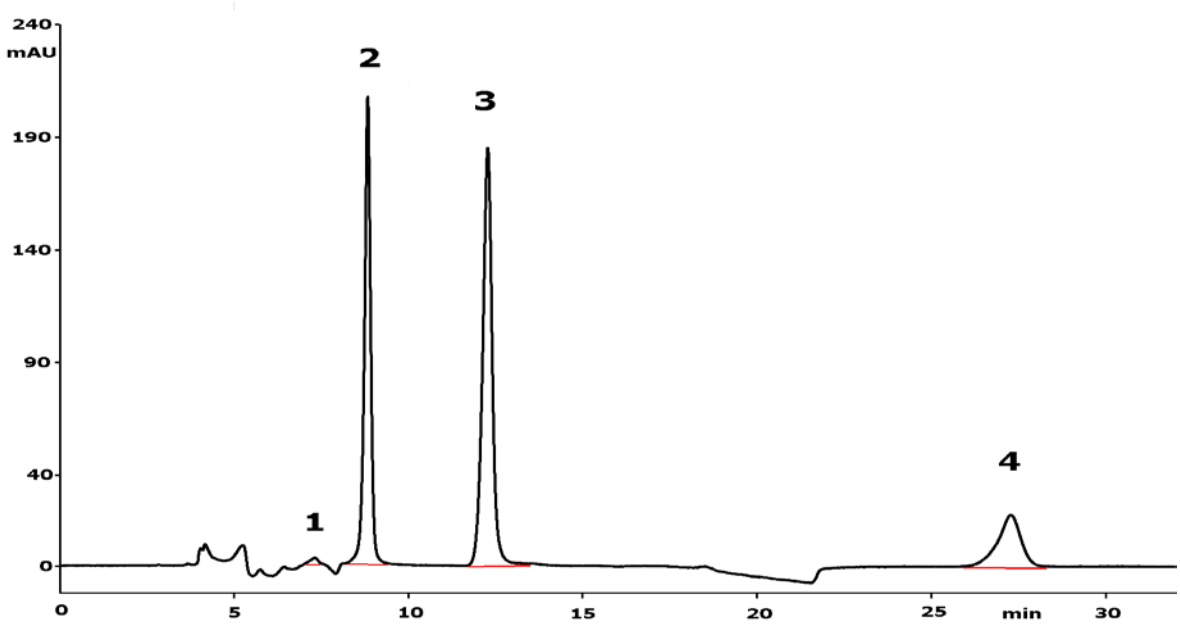
IC Application Note U–73

Sulfur speciation in mining leachate by ion chromatography applying a perchlorate eluent and UV/VIS detection



In gold mining there is a tendency to switch from cyanide leaching to the much less toxic thiosulfate leaching process. Thiosulfate leaching is a sensitive process that requires more optimization of the components of the leach reaction to maximize gold recovery and reagent loss. Sulfite, thiosulfate, thiocyanate, and tetrathionate are separated on a Metrosep A Supp 5 - 250/4.0 column. Perchlorate is choosen as an eluent as most of the metal perchlorates are soluble in water. This avoids metal precipitation in the IC System.

Results

	Anions	Concentration [mg/kg]	RSD [%, n = 3]
1	Sulfite	< 1	-
2	Thiosulfate	58.8	2.2
3	Thiocyanate	49.7	1.9
4	Tetrathionate	28.6	1.4

Metrohm

Sample

Mining leachate

Sample preparation

Dilution 1:2 in ultrapure water, injection after filtration (0.45 µm).

Columns

Metrosep A Supp 5 - 250/4.0	6.1006.530
Metrosep A Supp 4/5 - Guard/4.0	6.1006.500

Solutions

Eluent	10 mmol/L sodium perchlorate 1.0 mmol/L sodium hydroxide

Analysis

UV/VIS detection

Parameters

Flow rate	0.7 mL/min
Injection volume	20 µL
P_{max}	15 MPa
Recording time	32 min
Column temperature	35 °C
Wavelength	215 nm

Instrumentation

940 Professional IC Vario ONE	2.940.1100
944 Professional UV/VIS Detector Vario	2.944.0010
858 Professional Sample Processor	2.858.0020