



Sulfate

FIALab standard method for Sulfate Assay using the FIALab-2500/2600/2700 system.

Assay	Typical Throughput	Concentration Range	Notes
Sulfate (Mid-High)	120 samples/hour	100 to 500 mg SO ₄ /L)	1 cm flow cell
Sulfate (Low)	60 samples/hour	2 to 200 mg SO ₄ /L	10 cm flow cell

Principle:

Sulfate in the sample is precipitated with acidified barium chloride. This precipitate scatters light producing a signal proportional to sulfate concentration. The following method should work for concentrations from 3ppm to 200 ppm. Please inquire for suggestions on how to measure lower or higher concentrations than these ranges.

Comments:

For most Sulfate assays make the sample loop from 12 inches of 0.03" ID tubing. Use a 10 cm flow cell for concentrations of 2 ppm to 200 ppm. Use a 1 cm flow cell for concentrations consistently greater than 100 ppm. **Recommended monitored wavelength is 365 nm**, though any wavelength from 300 to 800 nm will work. The shorter wavelength will give a better response. 365 nm is mainly selected (instead of e.g., 300 nm) since low cost 365 nm LEDs are readily available (contact FIALab for additional information).

Do not use a reference wavelength.

Sulfate can be added to the reagent to “seed” the precipitate. This is necessary for the lower concentrations.

Reagent should be continuously gently stirred while being used to prevent settling.

Use the micro-volume 10 cm flow cell SMA-Z-100-uvol
<http://www.flowinjection.com/Brochures/sma-z-flow-cell.aspx> which will keep the flow-rate high through the optical path and not allow settling of particulates.

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Interferences:

Color and suspended particulates will interfere. Sulfites and sulfides may oxidize and then precipitate as barium sulfate. Large quantities of organic matter interfere.

Reagents:**Carrier: Matrix Match**

Matrix Match. If samples are water then use water as carrier. If soil extract, then (typically) add KCL in proportion with the extracted samples, e.g., 12 g KCL per liter of water. The matrix matching isn't critical if samples have greater than 100 ppm Sulfate concentration.

Reagent 1: Barium Chloride + HCL + Sulfur (for one liter)

60.0 grams BACl Dihydrate

10 ml 1N Hydrochloric acid 0.016 grams Sulfate, supplied as 1.6 mL of a 10,000 ppm solution in DI Water (for < 20 ppm samples)

1-Liter DI Water. Stir until dissolved.

Note: It is recommended that reagent 1 be slowly stirred with a stir bar while being used. This will prevent the settling of the seeded sulfate during the course of the run

Reagent 2: No Reagent 2 – plug this channel port

Note: Barium sulfate will cause deposit build-up in the fluidic manifold. In order to prevent clogging, a clean-up injection of 0.01 M NaOH – 0.01 M EDTA is recommended after every 10 samples. Furthermore, the instrument shutdown should include a short (5 min) wash with 0.01 M NaOH - 0.01 M EDTA. This should be followed by a final (10 min) wash with deionized water.

Standards:

100ml ICSUL-100 (Sulfate standard)

Source: 727-524-7732 - www.exaxol.com

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