



SULFATE ION CONCENTRATION

Sulfate ions are present in many natural, ground and surface waters. In bentonite based mud systems flocculation and resultant high viscosity can result from sulfate ion concentrations approaching or exceeding 2000 mg/L. A qualitative or more quantitative test can be performed to establish the sulfate concentration.

EQUIPMENT AND CHEMICALS

Equipment		Product Code
1.	Dropper bottle of barium chloride	EY1000
2.	Dripper bottle of strong nitric acid	
3.	Test tube	

TEST PROCEDURE

1. Place 2-4 mL of filtrate in a test tube and add a few drops of barium chloride.
2. Shake the tube gently and observe the presence of a milky, white precipitate. This indicates the presence of carbonates and/or sulfates.
3. Add a few drops of nitric acid and shake again. If the precipitate dissolves and disappears completely, only carbonates were present. If the precipitate remains, its intensity can be used for a qualitative estimate of the sulfate concentration.

RESULTS

Trace

- the precipitate is barely discernible
- less than 50 mg/L sulfate ions are present

Show

- the precipitate is a translucent white suspension
- up to 500 mg/L sulfate ions are present

Light

- the precipitate is a milky white suspension
- up to 1000 mg/L sulfate ions are present

Heavy

- the precipitate is a heavy curdly white suspension
- more than 1500 mg/L sulfate ions are present
- the precipitate could be diluted for a more accurate determination of the concentration

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QUANTITATIVE TEST

One method of quantitatively determining the sulfate ion concentration is with the use of the Hach Model SF-1 Sulfate Kit.

1. Fill the calibration tube to the top with filtrate to be tested.
2. Pour this sample into the mixing tube.
3. Add the contents of one SulfaVer IV powder pillow. Swirl to mix. A white, turbid precipitate will appear if sulfate is present.
4. Allow to stand for 5 minutes.
5. Hold the calibrated tube in such a manner so that it can be viewed through the top. Slowly pour the prepared sample into the tube. Continue pouring until the image of the black cross on the bottom of the tube just disappears from view. At this point the tube will appear as a uniform field of view.
6. Read mg/L sulfate (SO_4) from the scale on the side of the calibrated tube.

NOTE: The difference between mg/L and ppm is not significant until sulfate concentrations exceed 7000 mg/L.

WARNING: The reagents may be hazardous to the health and safety of the user if inappropriately handled.