

# DETERMINATION OF SULPHATE IN WATER SAMPLE BY TURBIDIMETRY TECHNIQUE

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## Abstract:

Sulphate ( $\text{SO}_4$ ) can be naturally occurring found in almost all natural water. The sources of most sulphates are the oxidation of sulphite ores, the presence of shales, municipal or industrial discharge. Sulphate mostly results from the broken leaves that fall from trees and floats through natural water (river) and mix with rocks and soil that contains sulphate minerals called gypsum. So this sulphate mineral dissolves in the water and in the water sulphate concentration becomes measurable.

The turbidimetric method for the determination of sulphate depends upon the principle that sulphates are converted into barium sulphate precipitate in a colloidal form. The absorbance of the barium sulphate solution is measured by a turbidimeters and the sulphate concentration, is measured by comparison of the reading with a standard curve.

This paper is review of various methods suggested for turbidimetric analysis of sulphates.

**Key words:** Turbidimetry, Sulphate, Natural water, Minerals, Precipitate.

## Introduction:

Sulphates at normal concentration are not toxic. Problems caused by sulphates are mostly related to their ability to form strong acids which changes the pH. Sulphates are big matter of concern as they are indirectly responsible for serious problems like handling and wastewater treatment. The minerals that contain sulphate are Sodium Sulphate called Glauber's salt, Magnesium Sulphate called Epsom salt, and Calcium Sulphate called Gypsum.

<sup>1</sup>According to world health organization 2004, typical sulphate levels in fresh spring water are in the vicinity of 20 mg/l and range from 0 to 630 mg/l in rivers. High doses of sulphate particularly magnesium sulphates, cause catharsis or purging of the bowels, and magnesium sulphate or Epsom salts has been used as a purgative (Cocchetto et al., 1981).

<sup>1</sup>Sulphate may also contribute to the corrosion of pipelines in the distribution system (Mariraj et.al, 2013).

There are many methods to determine the sulphate concentration. Turbidimetry method is widely used for determination of sulphates. The basic principle used in this method is quantitative precipitation by barium chloride. Due to fine particles of barium sulphate turbidity formed is proportional to the amount of sulphate in the sample, a photometric reading enables the sulphate concentration to be accurately determined.

Turbidimetry is a method for determining the concentration of a substance, when electromagnetic radiation is passed into the solution containing suspended particles some light will be absorbed some light will be transmitted, some light is scattered or reflected depending on size of the particle. The intensity of transmitted light is measured in Turbidimetry. The intensity of transmitted light can be related with concentration of suspended particle. The instrument used for this measurement is turbidimeters.

Breitlauch, K., & Cheng, C. (1982) proposed the simple method to determine sulphate by precipitation as  $\text{BaSO}_4$ . When  $\text{BaCl}_2$  is added to sample containing sulphate the precipitate gets suspended after addition of conditioning agent.. With the help of turbidimeters the turbidity was measured, the method is linear up to 5.0ppm. The method can be used for determining the sulphate from rain water.

Zarate Nestor et al determined the sulphate in rainwater by using LED based photometer and multi commuted flow analysis system, to improve sensitivity pre concentration was done after setting the optimum conditions the method gave linear response from 0.1 mg /L up to 2.0 mg /L, detection limit of 0.04 mg/L relative standard deviation of 1.5% for 0.5mg/L  $\text{BaCl}_2$  consumption was 17.0 mg per determination with waste of 7.3 ml per determination.

Yogita Sharma et al had done the comparative determination of sulphates in drain water, Surface water, Tap water, Ground water and canal by using Turbidimetry. Barium Chloride was used as precipitating agent and glycerol with conc. HCl distilled water 95% ethyl alcohol and 75 g sodium chloride was used as conditioning agent. Concentration of sulphate was calculated from calibration curve.

Conclusion: Turbidimetry method is found to be the sensitive and economic technique to determine sulphate in water samples.

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