

## Method Abstract

### Summary:

Use this method for determining anionic surfactants in fresh water and wastewaters. The anionic surfactants most often found in wastewater are soluble sodium salts of alkyl sulfates and alkyl benzene sulfonates. When these anionic surfactants mix with the water-soluble cationic dye, methylene blue, an ion pair forms. In mixtures of chloroform and water, the ion pairs become extracted into the chloroform layer, transferring the blue color into the organic phase. The amount of anionic surfactants in the sample can be found by comparing a standard absorbance versus concentration curve at 640 nm, the absorbance maximum of methylene blue in chloroform.

### Interferences:

The presence of heavy metals or cationic surfactants can remove some of the anionic surfactants from solution. High chloride concentrations can interfere with the solubility of methylene blue. Anions such as chloride ( $\text{Cl}^-$ ) and nitrate ( $\text{NO}_3^-$ ) interfere by forming ion pairs with methylene blue, causing positive bias. The reaction of methylene blue dye with anionic surfactants is not stoichiometric, and the color sensitivity of the dye differs for each class of surfactant.

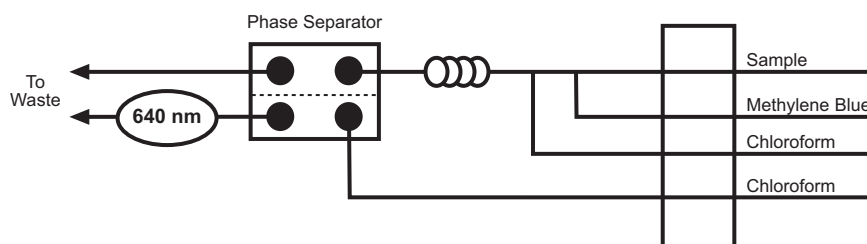
### Performance Specifications:

Range	0.03–5.0 mg/L
Throughput	24 samples/hour
Precision at 0.03 mg/L	<5.0% RSD
0.50 mg/L	<2.0% RSD
5.0 mg/L	<2% RSD
Method Detection Limit (MDL)	0.005 mg/L

### Chemicals:

Chloroform, $\text{CHCl}_3$	Sodium dodecyl sulfate, purity 99.0%, $\text{C}_{12}\text{H}_{25}\text{OSO}_3\text{Na}$
1-Dodecanesulfonic acid, sodium salt, $\text{C}_{12}\text{H}_{25}\text{SO}_3\text{Na}$	Sodium phosphate monobasic monohydrate, $\text{NaH}_2\text{PO}_4 \cdot \text{H}_2\text{O}$
Methylene blue chloride trihydrate, $\text{C}_{16}\text{H}_{18}\text{N}_3\text{S} \cdot 3\text{H}_2\text{O}$	Sulfuric acid, concentrated, $\text{H}_2\text{SO}_4$

### Basic Flow Diagram:



### Note:

This method is based on Standard Method 2120B and USEPA 600/4-79-020, and is equivalent to ISO Method ISO/DIS 16265.

### Selected References:

*Methods for Chemical Analysis of Water and Wastes*; EPA-600/4-79-020; U.S. Environmental Protection Agency, Office of Research and Development, Environmental Monitoring and Support Laboratory: Cincinnati, OH, 1984.

Burkhardt, M.R; et. al. *Methods of Analysis of the U. S. Geological Survey National Water Quality Laboratory*; Report 95-189; U.S. Geological Survey: Denver, CO, 1995.