Chlorophyll and Pheophytin in Marine and Fresh Water Algae

What are Chlorophyll and Pheophytin?

Chlorophyll, which has several forms, is capable of channeling the energy of sunlight into chemical energy through the process of photosynthesis. In photosynthesis, the energy absorbed by chlorophyll transforms carbon dioxide and water into carbohydrates and oxygen.

\[ \text{CO}_2 + \text{H}_2\text{O} \rightarrow (\text{CH}_2\text{O}) + \text{O}_2 \]

The concentration of these photosynthetic pigments is commonly used to estimate phytoplankton biomass. Pheophytin a is a common degradation product of Chlorophyll a, and can interfere with the determination of Chlorophyll a.

EPA Method 445.0

ALS uses EPA Method 445.0 for the low level determination of Chlorophyll a and Pheophytin a in surface water algae (detection limit of 0.01 µg). The method has two acceptable approaches to correct for interferences from Chlorophyll b and pheopigments. The most effective means of removing these interferences (referred to in EPA 445.0 as the modified method) is the use of a set of narrow bandpass excitation and emission filters. However, our recommended method is the modified method. ALS offers both acceptable approaches at our Vancouver, Winnipeg, and Yellowknife laboratories.

Visit our website for more information about ALS.

Scan the QR Code with your smartphone or search for “ALS Environmental” on YouTube.

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Benefits

The benefits of using fluorometry over spectrophotometry include:

- Much lower detection limits due to 1000 times greater sensitivity
- Less sample volume is required due to the greater sensitivity, which means less sample has to be filtered or shipped, saving time, and money

Sample Collection, Preservation, & Holding Times

Typically, 200 mL of sample is sufficient to perform the analysis, even in open ocean areas where phytoplankton density is low.

Filtration through a 0.45 µm mixed cellulose filter is recommended and available from ALS free of charge. Filters should be folded in half and placed in the black centrifuge tubes provided to minimize exposure to light and frozen within 48 hrs.

Once frozen to -20°C, samples have a holding time of 28 days.