

Chlorophyll a

What is it?

Chlorophyll a is the green pigment in plants that helps plants change light into food (i.e., for photosynthesis).



Chlorophyll a is measured as the number of micrograms per one liter ($\mu\text{g Chl } a/\text{L}$) of water.

Why do we measure it?

Measuring the concentration of chlorophyll a in water provides an estimate of algal biomass (i.e., amount of phytoplankton), which is an indicator of the health of a body of water. Too much or too little overall algal growth, or too much of a certain type of algae (such as cyanobacteria, often called blue green algae), can cause problems in an aquatic ecosystem. If there are insufficient levels of chlorophyll a in a body of water there might not be enough food available to sustain its food web. On the other hand, too much chlorophyll a could signal a rapid growth of algae and indicate an algal bloom. One reason an algal bloom presents a problem for aquatic ecosystems is because when algae die they can sink to the bottom and decompose, using up the oxygen which organisms need to live.

What affects it?

The amount of chlorophyll a found in a body of water depends on the water's temperature, nutrient content, sunlight and wind. Humans increase the amount of nutrients, such as nitrogen and phosphorus, when they allow sewage and fertilizer to pollute a body of water. The additional load of these nutrients facilitates the growth of algae beyond what is healthy for aquatic organisms. Fish can die due to low levels of oxygen and the number of plants can decrease due to a lack of sunlight. And some blue green algae can produce poisonous toxins that are harmful to living things.

Algae need sunlight in order to photosynthesize, thus they will grow in the sunlit portion of a lake. Therefore, the amount of chlorophyll a will vary depending on what depth the measurement is recorded.

Aquatic System Trophic Status	Mean Chlorophyll a Concentration ($\mu\text{g/L}$)
Oligotrophic	0.3 - 3
Mesotrophic	2-15
Eutrophic	> 10

Source: Wetzel, 2001

An oligotrophic water body typically has low productivity and low nutrient input. Under mesotrophic conditions, a water body has moderate nutrient input and productivity. When a water body reaches eutrophic conditions, there is high nutrient input and productivity. Often there is an excess of algae which can lead to reduced water clarity, low dissolved oxygen, and possibly harmful algal blooms.

