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# Difference Between Chlorophyll A and B

April 11, 2017 • by Lakna • 5 min read

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## Main Difference – Chlorophyll A vs Chlorophyll B

Chlorophyll A and B are two major types of chlorophyll found in plants and green algae. Both are involved in the process photosynthesis. Both chlorophyll A and B are found in chloroplasts, associated with integral membrane proteins in the thylakoid membrane. The **main difference** between chlorophyll A and B is their role in **photosynthesis**; **chlorophyll A is the principal pigment involved in the photosynthesis whereas chlorophyll B is the accessory**

**pigment, collecting the energy in order to pass into chlorophyll A.**

This article looks at,

### 1. What is Chlorophyll A

*– Definition, Characteristics, Role in Photosynthesis*

### 2. What is Chlorophyll B

*– Definition, Characteristics, Role in Photosynthesis*

### 3. What is the difference between Chlorophyll A and B

## CHLOROPHYLL A V E R S U S CHLOROPHYLL B

<p><b>Chlorophyll A</b> is the principal pigment that captures sunlight for photosynthesis</p>	<p><b>Chlorophyll B</b> is the accessory pigment that collects sunlight and passes into chlorophyll A</p>
<p>Absorbs the light in the range of 430 nm to 660 nm</p>	<p>Absorbs the light in the range of 450 nm to 650 nm</p>
<p>Around 1-2 <math>\mu\text{m}</math> size particles are ingested</p>	<p>Around 0.1-0.2 <math>\mu\text{m}</math> size liquid droplets are ingested</p>
<p>430 nm and 662 nm wavelengths are easily absorbed</p>	<p>470 nm wavelength is easily absorbed</p>
<p>Absorbs violet-blue and orange-red light from the spectrum</p>	<p>Absorbs orange-red light from the spectrum</p>
<p>Reflects blue-green in color</p>	<p>Reflects yellow-green in color</p>
<p>Contains a methyl group in the third position of its chlorin ring</p>	<p>Contains an aldehyde group in the third position of its chlorin ring</p>
<p>Molecular weight is 839.51 g/mol</p>	<p>Molecular weight is 907.49 g/mol</p>
<p>Found in all plants, algae, and cyanobacteria</p>	<p>Found in all plants and green algae</p>
<p>Accounts for <math>\frac{3}{4}</math> of total chlorophyll in plants</p>	<p>Accounts for <math>\frac{1}{4}</math> of total chlorophyll in plants</p>
<p>Solubility is low in polar solvents</p>	<p>Solubility is high in polar solvents</p>
<p>Present at the reaction center of the antenna array</p>	<p>Regulates the size of antenna</p>

## What is Chlorophyll A

The green pigment which is responsible for the absorption of light, providing energy for oxygenic photosynthesis is called chlorophyll A. It is found in all plants, green algae, and cyanobacteria. In chlorophyll A, the most effectively absorbing wavelengths of the spectrum are 429 nm and 659 nm, which are responsible for violet-blue and orange-red colors, respectively. Chlorophyll A reflects blue-green color, which is responsible for the green color of most of the land plants. Chlorophyll A is the most important pigment in photosynthesis, which serves as the primary electron donor in the electron transport chain of photosynthesis. On the other hand, it transfers the light energy trapped in the antenna complex into the photosystems P680 and P700, where the specific chlorophylls are present in the thylakoid membrane of the chloroplast. Chlorophyll A consists of a chlorin ring, where four nitrogen atoms surround a magnesium ion. Several side chains and hydrocarbon tails are also attached to the chlorin ring. The C-7 position of the chlorin ring is attached to a methyl group in chlorophyll A. The structure of chlorophyll A is shown in *figure 1*.

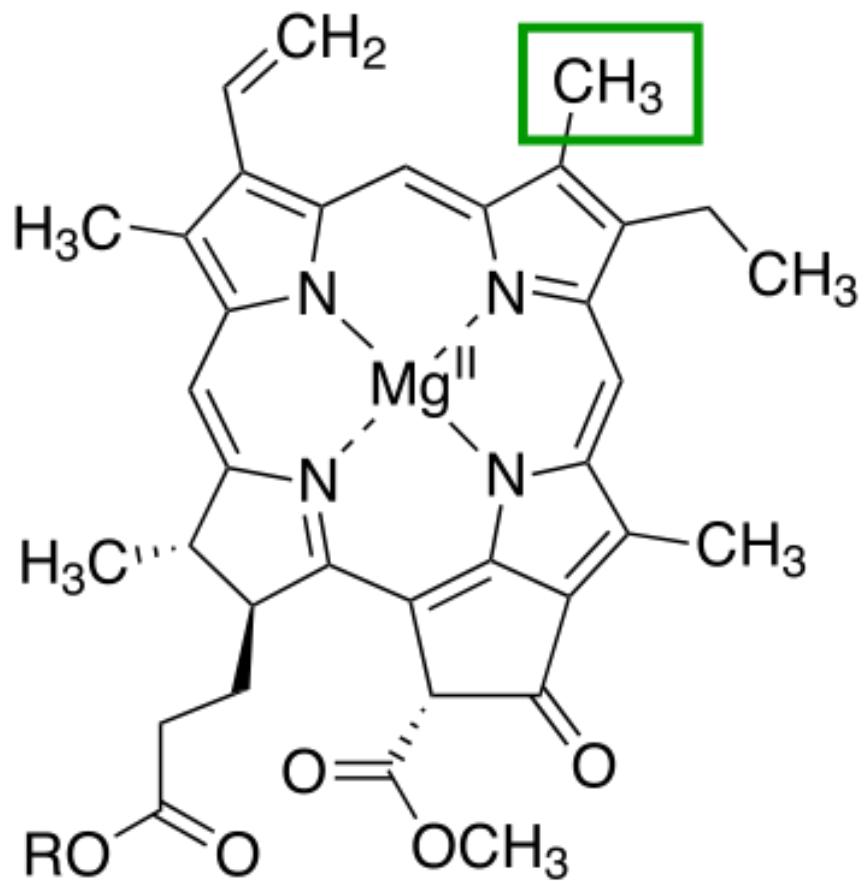
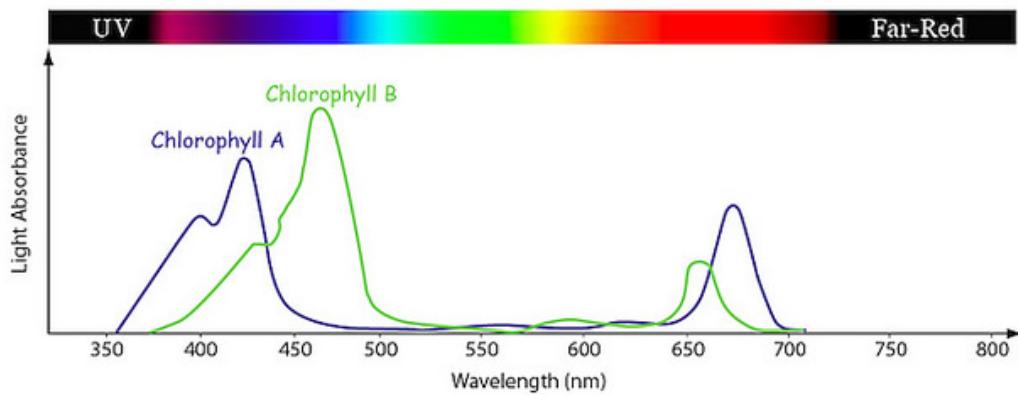


Figure 1: Chlorophyll A

## What is Chlorophyll B

The green pigment which is responsible for collecting light energy and passing into chlorophyll A during photosynthesis is called chlorophyll B. It is found in plants and green algae. In chlorophyll B, the most effectively

absorbing wavelengths of the spectrum are 455 nm and 642 nm, which are responsible for violet and red colors respectively. Chlorophyll B reflects a yellow-green color. In land plants, most of the chlorophyll B is found in light trapping antenna in photosystem P680. The structure of chlorophyll B is mostly similar to chlorophyll A. But, the C-7 position of the chlorin ring is attached to an aldehyde group in chlorophyll B.



*Figure 2: Absorption spectrum of chlorophyll A and B*

## Difference Between Chlorophyll A and B Contribution in Photosynthesis

**Chlorophyll A:** Chlorophyll A is the principal pigment that captures sunlight for photosynthesis.

**Chlorophyll B:** Chlorophyll B is the accessory pigment that collects sunlight and passes into chlorophyll A.

## Absorption Range

**Chlorophyll A:** Chlorophyll A absorbs the light in the range of 430 nm to 660 nm.

**Chlorophyll B:** Chlorophyll B absorbs the light in the range of 450 nm to 650 nm.

## Effective Absorbing Wavelength

**Chlorophyll A:** The wavelengths which are effectively absorbed by chlorophyll A are 430 nm and 662 nm.

**Chlorophyll B:** The wavelength which is effectively absorbed by chlorophyll B is 470 nm.

## Absorbing Color

**Chlorophyll A:** Chlorophyll A absorbs violet-blue and orange-red light from the spectrum.

**Chlorophyll B:** Chlorophyll B absorbs orange-red light from the spectrum.

## Reflecting Color

**Chlorophyll A:** Chlorophyll A reflects blue-green in color.

**Chlorophyll B:** Chlorophyll B reflects yellow-green in color.

## Structural Difference

**Chlorophyll A:** Chlorophyll A contains a methyl group in the third position of its chlorin ring.

**Chlorophyll B:** Chlorophyll B contains an aldehyde group in the third position of its chlorin ring.

## Chemical Formula

**Chlorophyll A:** The chemical formula of chlorophyll A is  $C_{55}H_{72}MgN_4O_5$ .

**Chlorophyll B:** The chemical formula of chlorophyll B is  $C_{55}H_{70}MgN_4 O_6$ .

## Molecular Weight

**Chlorophyll A:** The molecular weight of chlorophyll A is 839.51 g/mol.

**Chlorophyll B:** The molecular weight of chlorophyll B is 907.49 g/mol.

## Occurrence

**Chlorophyll A:** Chlorophyll A is found in all plants, algae and cyanobacteria.

**Chlorophyll B:** Chlorophyll B is found in all plants and green algae.

## Amount

**Chlorophyll A:** The  $\frac{3}{4}$  of total chlorophyll in plants are Chlorophyll A.

**Chlorophyll B:** The  $\frac{1}{4}$  of total chlorophyll in plants are Chlorophyll B.

## Solubility in Polar Solvents

**Chlorophyll A:** The solubility of chlorophyll A is low in polar solvents. Chlorophyll A is soluble in petroleum ether.

**Chlorophyll B:** The solubility of chlorophyll B is high in polar solvents like ethanol and methanol compared to chlorophyll A.

## Role

**Chlorophyll A:** Chlorophyll A is present at the reaction center of the antenna array.

**Chlorophyll B:** Chlorophyll B regulates the size of the antenna.

## Conclusion

Chlorophyll A and B are the two major pigments, involved in photosynthesis. Chlorophyll A is the primary pigment of photosynthesis, trapping the light energy and emitting high-energy electrons into the two photosystems P680 and P700. Chlorophyll B is the accessory pigment, passing the trapped energy into chlorophyll A. Thus, the main difference between chlorophyll A and B is their functions in photosynthesis. Chlorophyll A is present in all the photosynthetic organisms on earth, giving a bluish green color to those organisms. Chlorophyll B gives a yellowish green color to organisms. Chlorophyll B is the accessory pigment in photosynthesis, trapping and passing high energy electrons to chlorophyll A. The most absorbing wavelengths of chlorophyll A and B are 439 nm and 455 nm respectively.

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## About the Author: Lakna

Lakna, a graduate in Molecular Biology & Biochemistry, is a Molecular Biologist and has a broad and keen interest in the discovery of nature related things

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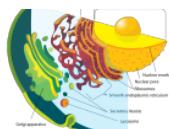
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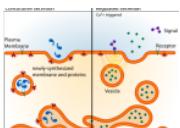
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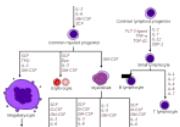
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