

# Difference Between Anthocyanin and Anthocyanidin

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## Key Difference – Anthocyanin vs Anthocyanidin

Anthocyanin and anthocyanidins are considered to be elements of plant [pigments](#) found in higher plants of the plant kingdom. They are found mainly in fruits and flowers but also in leaves, stems, and roots. They belong to the category of bioflavonoids. They share a common structure; the flavylium ion. **Anthocyanidins are sugar-free analogues to anthocyanins whilst anthocyanins are formed by the coupling of [sugars](#) to anthocyanidins.** This is the key difference between anthocyanin and anthocyanidin.

## What are Anthocyanins?

Anthocyanins are a group of plant pigments that belong to the group flavonoids or bioflavonoids. They mainly develop in higher plants. It is mostly prevalent in fruits and flowers which give a colour of red and blue; it is also present in stems, leaves, and roots. The colour of anthocyanins depends on the level of acidity. In acidic conditions, anthocyanins appear in red whilst, in less acidic conditions, they appear in blue. Anthocyanins can be subdivided into two categories: anthocyanidin aglycons and anthocyanin glycosides. The basic core structure of anthocyanins is the flavylium ion with seven different side groups. The side groups can be a hydrogen atom, a [hydroxide](#) or a methoxy group.

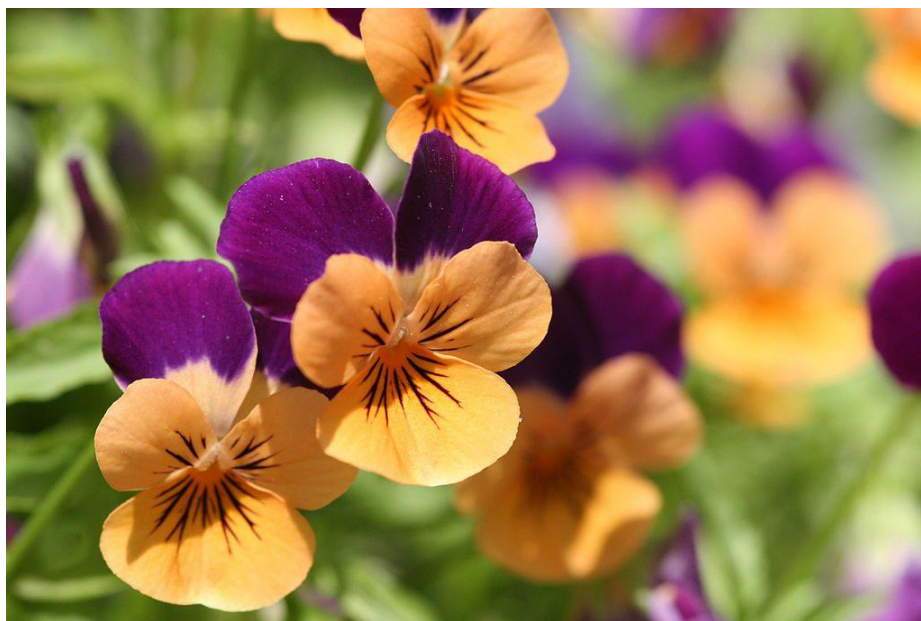


Figure 01: Dark purple colour of Pansies is due to Anthocyanin

Anthocyanins possess different functions in the plant body. They function as [antioxidants](#) that protect the plant body against free radicals produced by UV radiation that disrupts DNA and cause cell death. They are also considered to be important aspects of plant [pollination](#) and reproduction since pollinating agents are attracted due to its bright red and blue colours. Common anthocyanins such as cyaniding-3-glucoside are considered to be larvae repellent.

### **What are Anthocyanidins?**

Anthocyanidin, being a type of bio-flavonoid, is a chemical compound which is responsible for pigmentation of plants. They are sugar-free analogues of anthocyanins which are based on flavylum ion. Here, the counter ion is mainly chloride and this positive charge differentiates the anthocyanidins from other flavonoids.

Anthocyanidins are considered as antioxidant flavonoid pigments that give a purple or red colour to the fruits and vegetables such as grapes, cherries, raspberries, blueberries, plums, beets and purple cabbage. It also gives bright colours to flowers. This helps to attract various agents of pollination towards the flower. Plants also maintain their matured progeny due to the pigmentation provided by anthocyanidins. Anthocyanidins provide protection to the photosynthetic tissues in plants from direct sunlight. Anthocyanidins depend on the pH to maintain the stability. Colored anthocyanidins exist under low pH levels while colourless forms of chalcones exist under higher pH levels.

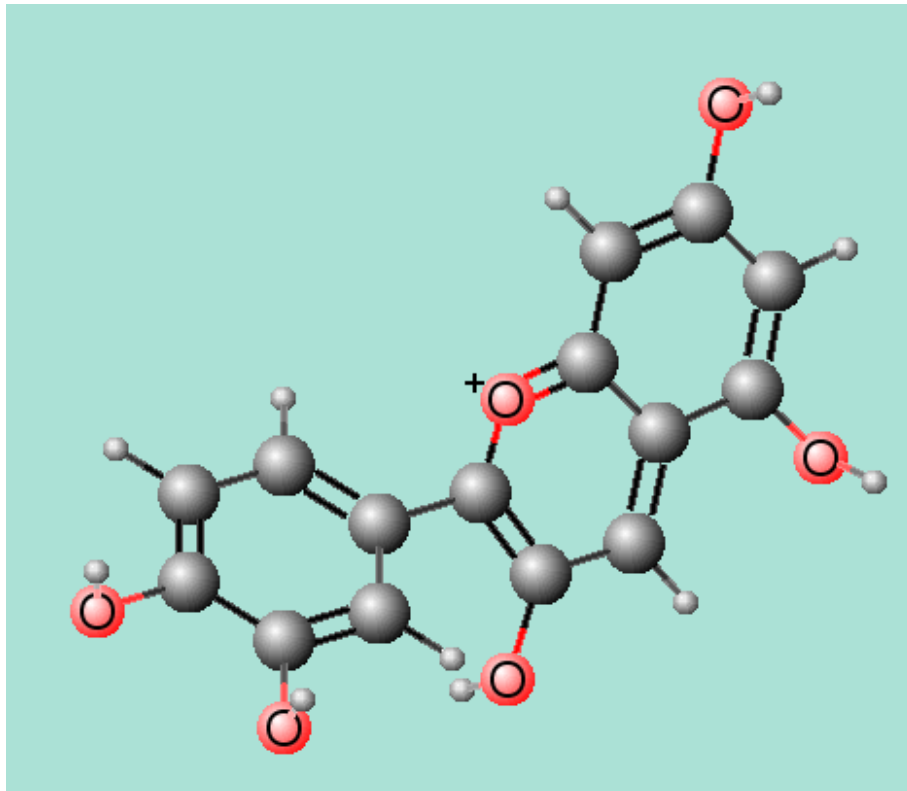


Figure 02: Anthocyanidine Structure

## What are the similarities between Anthocyanin and Anthocyanidin?

- Both anthocyanins and anthocyanidins are plant pigments.
- The basic core structure is flavylium ions.
- Both act as antioxidants that protect the DNA from free radicals formed.
- They are pH dependent.
- Both pigments help in pollination which attracts pollinating agents.

## What is the difference between Anthocyanin and Anthocyanidin?

| Anthocyanin vs Anthocyanidin  |  |
|---|--|
| Anthocyanins are plant pigments formed by the coupling of sugars to the anthocyanidin molecule. | Anthocyanidins are sugar-free analogues of anthocyanins. |
| Structure and Composition   |  |
| In anthocyanin, basic flavylium   | In anthocyanidins, no sugars are                         |

| ion with sugars is attached at different side groups.  | attached to the side groups of flavylum ion.   |
|--|--|
| Pigments   |  |
| Anthocyanins produce red and blue colours according to the pH condition.   | Anthocyanidins produce a reddish purple colour.  |
| pH   |  |
| In acidic conditions, anthocyanins appear in red colour whilst in low acidic conditions, they appear in blue colour. | Anthocyanidins appear in coloured form under low pH conditions whilst at high pH conditions, they appear colourless. |

## Summary – Anthocyanin vs Anthocyanidin

Anthocyanins and anthocyanidins are two specific types of elements in plant pigments that belong to the group, bioflavonoids. Both compounds share a common basic core structure, which is the flavylum ion. Anthocyanidins are sugar-free analogues of anthocyanins. Anthocyanins are formed by the addition of sugars to different side groups of the flavylum ion. This is the main difference between anthocyanin and anthocyanidin. Since different types of sugars are present, they can be at different side groups, giving rise to a vast range of anthocyanin types. Both compounds are pH dependent and possess antioxidant properties. They help in the process of pollination and act as larvae repellants that cause harm to the plant body.

### References:

1. "Anthocyanin." Wikipedia. Wikimedia Foundation, 31 July 2017. Web. [Available here](#). 09 Aug. 2017.
2. "Anthocyanidin." Wikipedia. Wikimedia Foundation, 07 Aug. 2017. Web. [Available here](#). 09 Aug. 2017.

### Image Courtesy:

1. "Orange violet pansies" By en:User Debivort – [http://en.wikipedia.org/wiki/Image:Orange\\_violet\\_pansies.jpg](http://en.wikipedia.org/wiki/Image:Orange_violet_pansies.jpg) ([CC BY-SA 3.0](#)) [Commons](#)

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**APA:** Difference Between Anthocyanin and Anthocyanidin. (2017, August 14). Retrieved (date), from <http://www.differencebetween.com/difference-between-anthocyanin-and-vs-anthocyanidin/>

**MLA:** "Difference Between Anthocyanin and Anthocyanidin" Difference Between.Com. 14 August 2017. Web.

**Chicago:** " Difference Between Anthocyanin and Anthocyanidin." Difference Between.Com. <http://www.differencebetween.com/difference-between-anthocyanin-and-vs-anthocyanidin/> (accessed [date]).



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