

Difference Between Vitamin K and K2

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Key Difference – Vitamin K vs K2

Vitamin K is a fat soluble vitamin which is hydrophobic in nature and is absorbed in the intestines via chylomicrons. Vitamin K levels are maintained in the body by the vitamin K cycle. Vitamin K cycle regenerates the vitamin with the availability of minute amounts. The vitamin K epoxide cycle, oxidizes Vitamin K, facilitating the carboxylation of Glutamic acid residues in vitamin K dependent proteins, which are blood clotting factors. Thus, the main function of vitamin K is helping in blood clotting. There are two main forms of Vitamin K, namely Vitamin K / Vitamin K1 and Vitamin K2. The key difference between vitamin K and vitamin K2 depends on the origin of the two vitamin forms. **Vitamin K are plant based derivatives of vitamin K** whereas **Vitamin K2 are synthesized by microorganisms and frequently found in fermented products and animal based food products.**

What is Vitamin K?

Vitamin K, also referred to as **vitamin K1** or **phylloquinone**, is the predominant form of vitamin K that naturally exists in most dietary forms. Phylloquinone is synthesized by plants and is present in almost all green leaves. Vitamin K1 structure is composed of a ring of 2-methyl-1, 4-naphthoquinone and an isoprenoid side chain. It is a light yellow viscous liquid or a solid. It is stable in air and moisture but loses its stability upon exposure to sunlight.

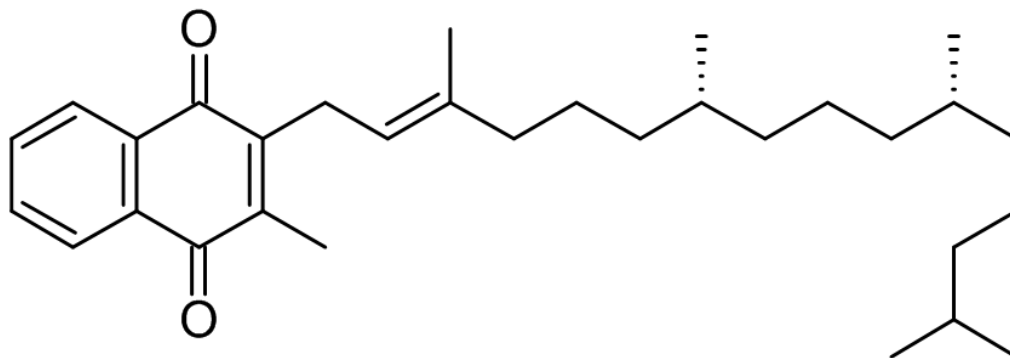
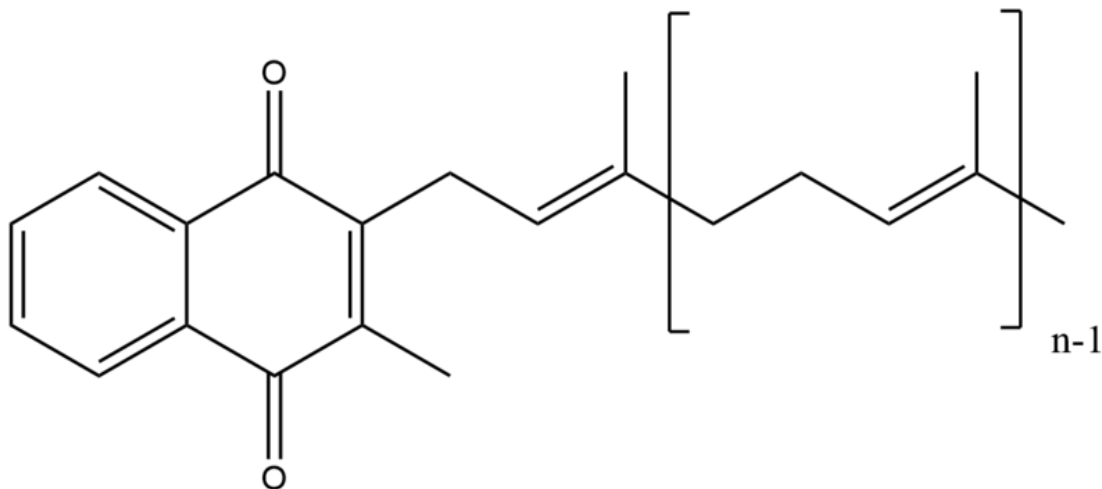


Figure 01: Vitamin K (phylloquinone structure)

Vitamin K contributes towards carboxylation of glutamic acid residues in proteins which are involved in the process of clotting. This is the major function of vitamin K.

What is Vitamin K₂?

Vitamin K₂, also referred as Menaquinone, participates in the carboxylation of glutamic acid similar to Vitamin K₁. But vitamin K₂ is synthesized mainly by gut microflora. Gut microflora is the microorganisms which reside in the gut. Thus, vitamin K₂ is present in fermented food and animal based products. Chemically, it is named as 2-methyl-3-all-trans-polyprenyl-1,4-naphthoquinone and is more stable compared to Vitamin K₁. Vitamin K₂ is mainly involved in maintaining calcium homeostasis and prevent the deposition of calcium in arteries and bones. Vitamin K requirement is balanced by consuming a minute quantity through diet as it can be synthesized through the gut microbiota. Hence, the daily dietary requirement for Vitamin K₂ is less compared to other vitamins.



Menaquinone (vitamin K₂)

Figure 02: Chemical structure of Vitamin K₂

What are the similarities between Vitamin K and K₂?

- Vitamin K and vitamin K₂ are naturally occurring forms of vitamin K.
- Both vitamins contain a hydrocarbon chain and an isoprenoid ring
- Both are hydrophobic.
- Both are fat soluble.
- Both vitamins are yellow to orange in colour.

- They involve in activating blood clotting factors and maintaining calcium homeostasis.

What is the difference between Vitamin K and K2?

Vitamin K vs K2	
Vitamin K (phylloquinone) is the naturally occurring form of vitamin K synthesized in plants.	Vitamin K2 (menaquinone) is the naturally occurring form of Vitamin K synthesized by microorganisms in the gut.
Dietary Sources	
Dietary sources of vitamin K are plants such as broccoli, spinach, lettuce.	Dietary sources of vitamin K2 are fermented food and animal based products.
Stability	
Vitamin K is less stable in air, moisture and sunlight.	Vitamin K2 is more stable in air, moisture and sunlight.
Main Function	
The main function of the vitamin K is the carboxylation of glutamic acid residues of blood clotting factors (proteins) to promote the clotting process.	The main function of vitamin K2 is to maintain calcium homeostasis and prevent deposition of calcium in arteries and bones.

Summary – Vitamin K vs K2

Vitamin K is a vitamin with potential health benefits as it is a vital factor for the blood clotting process and calcium homeostasis. Through the activation of the vitamin K epoxide, antioxidants such as glutathione are also activated, which adds on to the functional properties of vitamin K. Due to its vital role in human physiology, its presence is essential and this is balanced by a natural phenomenon where gut microbiota synthesizes vitamin K2, an isoform of vitamin K. In addition, the dietary vitamin K1 is constantly cycled through the vitamin K epoxide cycle to regenerate the active form of vitamin K. Thus, vitamin K deficiency is the least common vitamin deficiency.

References:

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