



FMC Corporation
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FACTS ABOUT CARRAGEENAN

- Carrageenan is a soluble fiber product derived from red seaweed and a food additive that has been consumed for hundreds of years around the world.
- Red seaweed is a naturally occurring, sustainable aquaculture that is grown and harvested in warm and cold waters by an estimated more than 30,000 family farms on five continents. Most of the seaweed used by global carrageenan producers is sourced from family farms in Southeast Asia (primarily Indonesia and the Philippines) and Tanzania in East Africa.
- Seaweed farming provides the primary economic base for thousands of coastal communities and family-owned farms around the globe and plays an important role in sustaining their families and communities.
- The farmed seaweed industry estimates that 210,000 metric tons of red seaweed is harvested globally every year at a value over \$250 million.
- Carrageenan enables the export of countless products by preserving their texture, structure and stability.
- Carrageenan is a high molecular weight polysaccharide consisting of galactose sulfate and anhydrogalactose sulfate units. It is a naturally occurring, non-synthetic substance.
- There are several types of carrageenan, from many different species of seaweed, which provide a large variety of properties in terms of solubility and texture.

ONE OF NATURE'S PERFECT STABILIZERS

- Carrageenan is a versatile product, used in a variety of foods such as ice cream and other dairy products, syrups and lunch meats.
- In addition, carrageenan is used to improve the sustainability for profile dietary supplements and non-food applications like personal care, pharmaceuticals and industrial uses. Derived from nature, carrageenan replaces animal-based products, like gelatin in soft capsules in pharmaceuticals, vitamins and dietary supplements and petrochemicals in paints and varnishes, cosmetics and lotions, reducing their VOC (volatile organic content) levels. Carrageenan also improves the manufacturing process efficiency and stability of toothpaste.
- When carrageenan is added to foods, it safely and efficiently stabilizes food.
 - It enables foods to be produced with lower levels of fats and sugars.



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- It enables processes that extend shelf life without loss of quality, and it reduces food waste.
- It enables recipes that eliminate the need for refrigeration, reducing consumption of electricity and fossil fuels during transportation and while on store shelves.
- It is often used as a thickening agent much in the same way ingredients such as flour, cornstarch and tapioca are used to thicken or bind other ingredients. Carrageenan has been used in the kitchens of Ireland for hundreds of years.
- Carrageenan from FMC is certified as both halal and kosher. It is also commonly used in place of animal-based products, like gelatin, making it suitable for vegetarian and vegan diets and lifestyles.
- When carrageenan is added to foods, it contributes to the efficient use of protein.
 - It enables the use of vegetable and animal protein to make products that taste good and are affordable in a world with an increasing demand for protein.
- Carrageenan is a product from red seaweed. It requires no fresh water or arable land to cultivate and contributes to fish habitats. Carrageenan's minimal processing and sustainable raw materials make it an ideal ingredient for organic foods.
 - It enables organic food producers to leverage technology and increase availability of their products.
 - It enables organic food producers to take advantage of the economic benefits of a safe and efficient stabilizer to make organic foods more available to people of all income levels.

CARRAGEENAN SAFETY

- Overwhelming evidence from numerous dietary studies, conducted over the past 40 years has demonstrated that carrageenan is a safe and suitable additive for use in food.
- Regulatory authorities in every region of the world including the United States, Europe, China, Japan and Brazil have found carrageenan safe for use in food.
 - This includes a July 2014 review by the Joint FAO/WHO Expert Committee on Food Additives (JECFA), which "concluded that the use of carrageenan in infant formula and formulae for special medical purposes for infants up to concentrations of 1000 mg/L is not of concern." The committee based their decision on the results of a new safety study that



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will be published in early 2015 and the results from numerous dietary studies that replicate the way humans ingest carrageenan to come to its conclusion.

- In addition, experts from the World Health Organization have placed carrageenan in the best possible category for any food additive, noting it “does not in the opinion of the committee represent a hazard to health.”
- The International Agency for Research on Cancer has found carrageenan to be non-carcinogenic.
- Carrageenan is an approved food additive.
 - Different bodies of scientific experts have reviewed all the science relevant to the way we consume carrageenan and they continue to conclude that carrageenan is safe for use in foods.
 - Carrageenan is a permitted additive for use in organic food in many countries. In fact, in the United States, after undergoing the required periodic review of carrageenan’s use and the supporting science, it’s listing was renewed recently for another 5 years and it remains approved as a non-synthetic additive for use in organic foods.
- Carrageenan and poligeenan are not the same.
 - Poligeenan is not a food additive and has no functionality in food.
 - Carrageenan does not turn into poligeenan during digestion, as the conditions necessary for poligeenan production (low pH, temperatures in excess of 175°F, extended timeframe) do not exist in the human digestive tract.
 - The Joint FAO/WHO Expert Committee on Food Additives (JECFA) concluded, “if native carrageenan were sufficiently degraded to cause ulceration or tumor growth, this would be detected in feeding studies.” Yet, no such effect has been detected.
- Carrageenan does not cause inflammation of the digestive tract (colitis, Crohn’s disease, etc.), and studies that assert a connection between ingesting carrageenan and gastrointestinal inflammation have been misinterpreted due to flawed methodology and comparisons.
- The process for making carrageenan is mild and preserves the functionality already in the seaweed. The effect of processing increases the amount of usable carrageenan in the seaweed, minimizing waste.



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- Carrageenan is derived from red seaweed that is cultivated in an environmentally friendly and sustainable manner. Most red seaweed is produced in Southeast Asia by small family farms without the need for fresh water or arable land.
- Used for hundreds of years, carrageenan is essential to meeting the global demand for nutritious food.

Carrageenan has a long history as a safe food stabilizer that thickens and extends shelf-life efficiency, helping to provide healthy and nutritious food to a hungry world.



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FREQUENTLY ASKED QUESTIONS

The following frequently asked questions and responses are meant for distribution to FMC customers. Please refer all additional inquiries to FMC Marketing Communications Manager, Lindsay Torriero at 215.299.6111. We will involve the appropriate technical expert to answer any additional questions.

What is carrageenan?

Carrageenan is a soluble fiber product derived from red seaweed and a food additive that has been consumed for hundreds of years. Carrageenan is a high molecular weight polysaccharide consisting of galactose sulfate and anhydrogalactose sulfate units. It is a naturally occurring, non-synthetic substance. The farmed seaweed industry estimates that 210,000 metric tons of red seaweed is harvested globally every year at a value over \$250 million.

What are the primary uses of carrageenan?

Carrageenan is a versatile product, used in a variety of foods such as ice cream and other dairy products, syrups and lunch meats. It is often used as a thickening agent much in the same way ingredients such as flour, cornstarch and tapioca are used to thicken or bind other ingredients. The broad functionality of carrageenan overcomes a range of food issues including fat and sugar reduction, expansion of protein availability and reduction in food waste through shelf-life extension.

- In addition, carrageenan is used to improve the sustainability profile for dietary supplements and non-food applications like personal care, pharmaceuticals and industrial uses. Derived from nature, carrageenan replaces animal-based products, like gelatin in soft capsules in pharmaceuticals, vitamins and dietary supplements and petrochemicals in paints and varnishes, cosmetics and lotions, reducing their VOC (volatile organic content) levels. Carrageenan also improves the manufacturing process efficiency and stability of toothpaste

Is carrageenan safe?

Overwhelming evidence from dietary studies, conducted over the past 40 years has demonstrated that carrageenan is a safe and suitable additive for use in food. Regulatory authorities in every region of the world including the United States, Europe, China, Japan and Brazil have found carrageenan safe for use in food. This includes a July 2014 review by the Joint FAO/WHO Expert Committee on Food Additives (JECFA), which “concluded that the use of carrageenan in infant formula and formulae for special medical purposes for infants up to concentrations of 1000 mg/L is not of concern.” The committee based their decision on the results of a new safety study that will be published in early 2015 and the results from numerous dietary studies that replicate the way humans ingest carrageenan to come to its conclusion.



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In addition, experts from the World Health Organization have placed carrageenan in the best possible category for any food additive and the International Agency for Research on Cancer has found carrageenan to be non-carcinogenic.

Can you explain how carrageenan is processed?

Carrageenan is derived from red seaweed that is cultivated in an environmentally-friendly and sustainable manner. Most red seaweed is produced in Southeast Asia by small family farms without the need for fresh water or arable land. The process for making carrageenan is mild and preserves the functionality already in the seaweed. The effect of processing increases the amount of usable carrageenan in the seaweed, minimizing waste.

Are carrageenan and poligeenan the same thing?

No. Poligeenan is a substance that requires aggressive processing using strong acids and high temperatures over a period of time compared to the minimal processing required to release and purify carrageenan.

Is there poligeenan in food?

Poligeenan is not a food additive and has no functionality in food.

Does carrageenan turn into poligeenan during digestion?

Carrageenan does not turn into poligeenan during digestion, as the necessary conditions for poligeenan production (low pH, temperatures in excess of 175°F) do not exist in the human digestive tract.

Does carrageenan cause inflammation of the digestive tract (colitis, Crohn's disease, etc.)?

Carrageenan does not cause inflammation of the digestive tract (colitis, Crohn's disease, etc.), and studies that assert a connection between ingesting carrageenan and gastrointestinal inflammation have been misinterpreted due to flawed methodology and comparisons.

Is carrageenan a GRAS substance?

Carrageenan is regulated as a food additive. For more discussion on GRAS, please contact Lindsay Torriero (lindsay.torriero@fmc.com) who can connect you to the right resource.