



Xanthan Gum

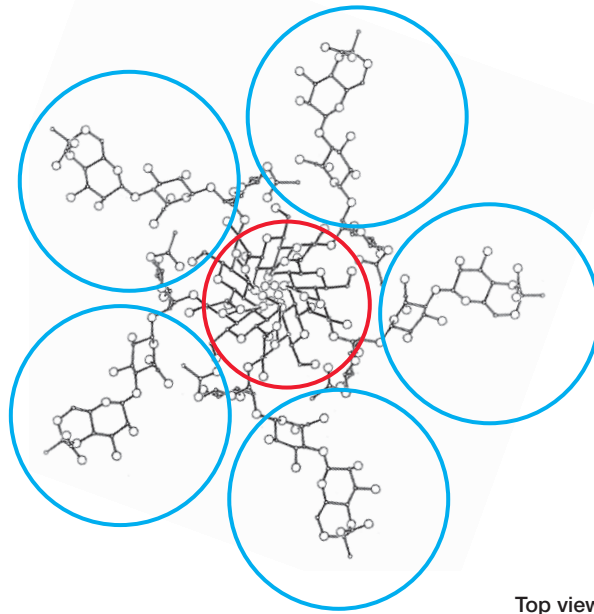
Jungbunzlauer

*From nature
to ingredients®*

Xanthan Gum

A hydrocolloid with outstanding properties

Xanthan gum is a natural polysaccharide. It was discovered in the late fifties in the research laboratories of the US Department of Agriculture during research work into the industrial applications of microbial biopolymers. Extensive research revealed that the bacterium *Xanthomonas campestris*, found on cabbage plants, produces a high molecular weight polysaccharide, which protects the bacterium from heat or other microorganisms. This polysaccharide, called xanthan gum, proved to have technically and economically outstanding properties. The industrial importance of xanthan gum is based upon its exceptional qualities as a rheology control agent in aqueous systems and as a stabiliser for emulsions, suspensions and foams.



Top view of a xanthan gum molecule

(Moorhouse et al. 1977)

Red = backbone

Blue = side chain

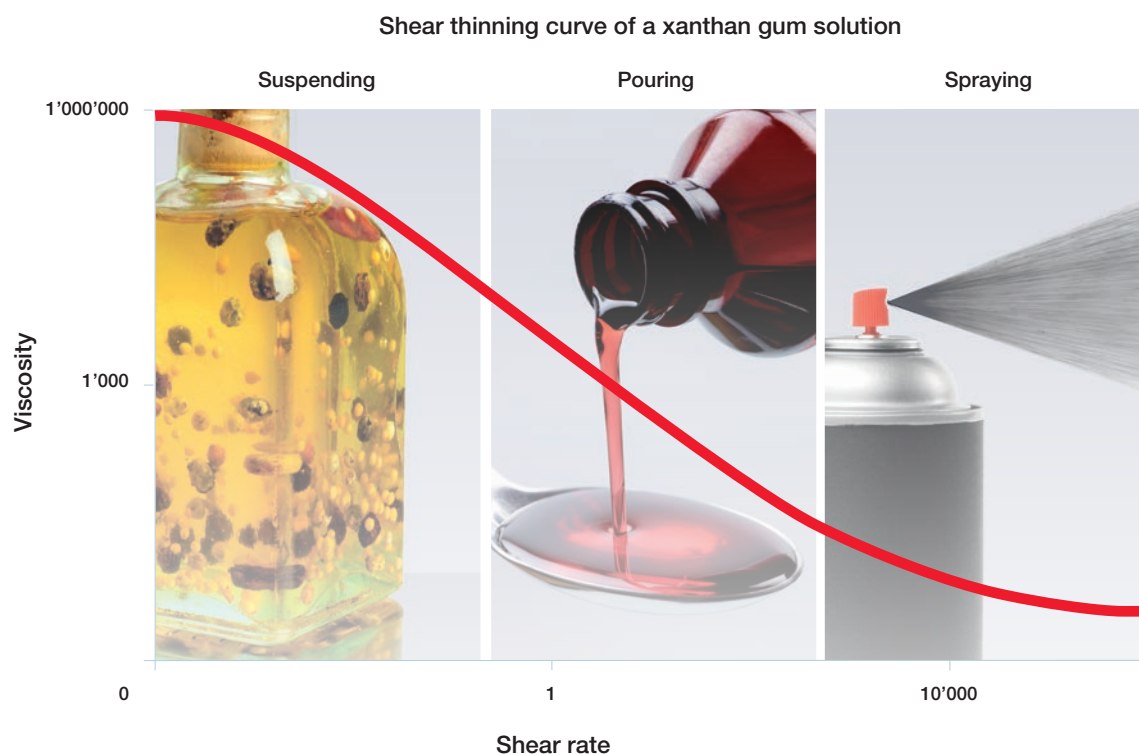
Structure

The primary structure of xanthan gum is a pentasaccharide repeating unit with a side-chain consisting of a glucuronic acid residue between two mannose units. The terminal mannose may possess an O-4 and O-6 linked pyruvate moiety. The mannose nearest the main chain carries a single acetyl group at C-6. Xanthan gum molecules form rigid right handed, fivefold helices. In this conformation the backbone is protected by the large, overlapping side chains.



Properties

Xanthan gum is a white to cream-coloured free flowing powder with a neutral taste. It is soluble in both cold and hot water and provides a rapid increase of viscosity. Even at low concentrations, xanthan gum solutions offer a higher degree of viscosity than other polysaccharides. Due to its elastic properties xanthan gum also features great stabilising effects, which allows the suspension of solid particles. Xanthan gum solutions are highly pseudoplastic (shear thinning) but not thixotropic, which means that after high shearing the initial viscosity is rebuilt instantaneously. Shear thinning enhances sensory qualities (flavour release, mouthfeel) and guarantees good pouring, brushing and cling of final products. Furthermore, it eases processing procedures such as mixing, pumping and spraying. Xanthan gum is very resistant to pH-variations and is therefore stable in both alkaline and acidic conditions. The thermal stability of xanthan gum is usually superior to most other water-soluble hydrocolloids. Its viscosity recovers after heat treatment steps during food processing, such as sterilisation or pasteurisation. Thus the rheological properties of the final products remain stable, irrespective of being kept in a refrigerator, stored at room temperature, or heated. Xanthan gum also improves the freeze/thaw stability of frozen foods.



Compatibility

Xanthan gum is compatible with most food, cosmetic and pharmaceutical ingredients. It tolerates most salts and specifically high levels of monovalent ions. Depending on the type of ions, pH and concentration, the addition of electrolytes can actually increase the viscosity and stability. Xanthan gum also has an excellent stability in the presence of acids and can be dissolved directly into many acidic solutions. Furthermore, it is compatible with most commercially available thickeners.

Combinations of xanthan gum with galactomannans, such as guar gum, locust bean gum and tara gum show strong synergistic interactions. This means an increase of the viscosity, which is higher than the sum of viscosities of either gum alone. Solutions of xanthan gum and locust bean gum can form thermally reversible gels.

Xanthan gum is highly resistant to enzymatic degradation due to the nature of the sugar linkages and the structure of the side chains on the polysaccharide backbone. Pure xanthan gum can therefore be safely used in the presence of most common enzymes such as galactomannanases, cellulases, amylases, pectinases and proteases. Xanthan gum is not directly soluble in most organic solvents. However, up to 50% of common solvents can be added to aqueous solutions of xanthan gum without precipitation of the gum.



Regulatory Status

Detailed investigations with respect to toxicology and safety have shown that xanthan gum is a safe food additive. It was cleared by the US FDA in 1969 and is registered in the Code of Federal Regulations. In 1980 the EC approved xanthan gum under the number E415. In 1988 the ADI (acceptable daily intake) of xanthan gum was changed to “not specified” confirming its status as a safe food additive and it may be used at “quantum satis” in many food categories. Jungbunzlauer’s food grade xanthan gum fully meets the specifications issued in the latest versions of USP-NF (United States Pharmacopeia-National Formulary), Ph. Eur. (European Pharmacopoeia), FCC (Food Chemicals Codex) and the respective EU Regulations.

Grades

Jungbunzlauer offers a number of different xanthan gum types, mostly for food, pharmaceutical and personal care applications as well as for industrial use:

- Xanthan Gum in various particle sizes
- Xanthan Gum in different viscosity ranges
- Xanthan Gum with highest purity for personal and oral care applications
- Dust free Xanthan Gum
- Salt tolerant Xanthan Gum
- Acid stable Xanthan Gum
- Xanthan Gum with reduced pseudoplasticity
- Easily dispersible Xanthan Gum
- Clear solution Xanthan Gum
- Xanthan Gum with delayed hydration for industrial applications
- ECOCERT and COSMOS approved Xanthan Gum
- Xanthan Gum blends for special purpose beverages

Preparation of Solutions

Xanthan gum is a hydrophilic biopolymer readily soluble in cold and hot water. Rapid dissolution requires an even dispersion of xanthan gum particles in the aqueous medium. For that reason, intense agitation of the solution is necessary when introducing xanthan gum into the aqueous phase. Insufficient dispersion will cause lumps. Preblending xanthan gum with other dry ingredients or presuspending it in oil or alcohol facilitates the preparation of xanthan gum solutions.

Quality

All Jungbunzlauer xanthan gum grades are manufactured without GMO and only traceable non-GMO raw materials are used. Jungbunzlauer food grade xanthan gum fully meets the specifications of US, EU and WHO regulations and is certified for use in Kosher or Halal foods and is suitable for vegan diets. To demonstrate our strict quality and food safety policy, the xanthan gum production facility Pernhofen is certified according to ISO 9001, FSSC 22000, GMP+ (feed) and Responsible Care schemes.

Storage and Stability

In its powder form xanthan gum can be easily and safely stored for several years. Xanthan gum solutions, however, although more resistant to microbial attack than most other water soluble biopolymers, should be protected by adequate preservatives when the storage time exceeds 24 hours.

Applications

Due to its extraordinary properties as stabiliser and thickener xanthan gum is extensively used in the food, personal care and pharmaceutical industry. In addition, xanthan gum is applied in various industrial applications and for oil drilling. In all of these areas xanthan gum is recognised as an excellent stabiliser and useful processing aid.



Food Applications	Usage in %	Function
Salad Dressings	0.1 - 0.5	provides easy pourability and good cling; suspends spices
Bakery Products, Gluten Free Bakery	0.05 - 0.3	binds water; improves texture and moisture retention; suspends fruits and nuts
Beverages	0.05 - 0.2	enhances mouthfeel; suspends fruit pulp
Instant Products	0.05 - 0.2	contributes body; quick viscosity build up in cold and hot water
Prepared Food	0.1 - 0.3	stabilises; avoids syneresis
Soups, Sauces and Gravies	0.05 - 0.5	provides good temperature stability; prevents separation; improves texture
Frozen Food	0.05 - 0.2	provides good freeze/thaw stability; contributes smooth texture
Dairy Products	0.05 - 0.2	inhibits syneresis; stabilises emulsions
Toppings	0.05 - 0.3	stabilises foams and emulsions; provides good flow and cling
Meat Products	0.2 - 0.5	binds water; inhibits syneresis
Low-calorie Products	0.1 - 0.5	improves texture; stabilises
Personal Care Applications	Usage in %	Function
Toothpaste	0.7 - 1.0	provides easy pumpability and excellent flow properties; gives good stand on the brush
Creams and Lotions	0.2 - 0.5	stabilises emulsions; gives creamy consistency
Shampoo	0.2 - 0.5	controls rheology; suspends insolubles
Industrial Applications	Usage in %	Function
Agricultural Chemicals	0.1 - 0.3	suspends active ingredients; controls drift and cling
Cleaners	0.2 - 0.7	provides good pH-stability; extends contact time
Polishes	0.2 - 0.7	suspends abrasive components
Water Based Paints	0.1 - 0.3	controls rheology; stabilises pigments; inhibits drip off
Textile and Carpet Printing	0.2 - 0.5	improves processing; controls colour migration
Adhesives	0.1 - 0.3	controls rheology and penetration
Paper Industry	0.1 - 0.2	acts as suspension aid and rheology control
Ceramic Glazes	0.3 - 0.5	suspends solids effectively
Oil Drilling	0.1 - 0.4	controls rheology; provides good stability against salt, temperature and shear
Enhanced Oil Recovery	0.05 - 0.2	functions as mobility control agent
Animal Feed	Usage in %	Function
Liquid Milk Replacers	0.05 - 0.2	stabilises water insoluble ingredients
Pet Food	0.1 - 0.4	prevents syneresis; contributes body to gravy
Pharmaceuticals	Usage in %	Function
Suspensions and Emulsions	0.1 - 0.5	provides excellent stability and good flow
Tablets	1.0 - 3.0	retards drug release
Lozenges	0.3 - 1.0	prolongs contact time of active ingredients



Jungbunzlauer Group

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From nature to ingredients®

Jungbunzlauer is one of the world's leading producers of biodegradable ingredients of natural origin. The Swiss-based, international company's roots date back to 1867. Today, Jungbunzlauer specialises in citric acid, xanthan gum, gluconates, lactics, specialties, special salts and sweeteners for the food, beverage, pharmaceutical and cosmetic industry as well as for various other industrial applications.

Jungbunzlauer's products are manufactured utilising fermentation technology, a natural process. All its products can be used, transported and disposed of in a secure and ecologically safe way. The Group operates manufacturing plants in Austria, Canada, France and Germany.

A worldwide network of sales companies and distributors with a thorough understanding of target markets and client requirements underlie Jungbunzlauer's high level of market and customer proximity. Committed to its rigorous quality standards, Jungbunzlauer guarantees for the excellence and sustainability of its products and services.

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