



Citric Acid

Jungbunzlauer

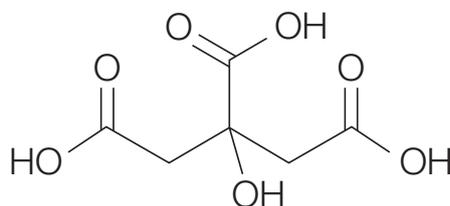
*From nature
to ingredients®*

Citric Acid

The Citric Part of Life

Many drinks, jams, cakes and sweets are characterised by the fresh taste of citric acid. Its appealing tart character – typical of carbonated and fruit-flavoured soft drinks – awakens the senses and teases the palate. In fact, citric acid offers a multitude of benefits through the many products we consume or use in our daily life.

Citric acid is an inherently natural product and is produced in almost all living cells as an intermediate during different metabolic pathways. Hence, significant amounts of citric acid are contained in most plant, animal and human tissues. Over the past century, it has become the organic acid of choice for fast moving consumer goods (FMCG), principally in the food and beverage industry as well as for a variety of industrial uses such as detergents and commercial cleaning agents. Citric acid is universally present in today's world, transcending cultural boundaries and serving multiple industries.



Lemon Juice and Fermentation Technology

For many centuries scientists have been trying to emulate nature by synthesising citric acid. In 1784, citric acid from lemons was isolated for the first time. Commercialisation, however, did not begin until the mid-1800s. The extraction process quickly became uneconomical as demand for citric acid grew.

During the 19th century scientists discovered a way of synthesising citric acid through microbial fermentation. The development of this entirely new production technique proved to be viable on an industrial scale. As a result, surface (and later deep tank) fermentation technology gradually replaced earlier extraction processes.

Jungbunzlauer has been producing citric acid at its Pernhofen Austria site since 1962 using a process of submerged microbial fermentation of carbohydrates. Following significant investment into research, state-of-the-art fermentation facilities and production technologies, citric acid soon became one of Jungbunzlauer's core products. In 2002, an additional citric acid plant was built and started operations in Port Colborne, Canada. Today, Jungbunzlauer ranks among the largest producers of citric acid in the world.





Thinking Ahead

A fundamental change has taken place in consumer life style and attitudes over the past three decades. Many well-known as well as new foodstuffs containing natural additives reflect this change. As a result, the demand for citric acid continues to grow especially since convenience, novel and functional food products rely on citric acid. Also with its mission "From nature to ingredients®" the company commits itself to the protection of man and environment. Jungbunzlauer is a responsible and sustainable leader in naturally derived biodegradable ingredients. The ECOCERT and COSMOS approval of Jungbunzlauer products shows our commitment and is important for all our customers seeking ingredients to formulate natural personal care products.

Not only has citric acid been a long-term component of cosmetics and pharmaceuticals, it has also found many uses within the cleaning industry. Today, citric acid based formulations play a key role in both household detergents and industrial cleaning systems. Citric acid and trisodium citrate have gained growing importance as biodegradable chelating agents that can replace polyphosphates and EDTA in a number of industrial applications. This trend is likely to continue due to increasing environmental awareness.

Continuing investments in new production capacities at our Austrian and Canadian facilities reflect our responsiveness to rising market demand and our aim to serve both global as well as local customers.



Quality from Procurement to Delivery

At Jungbunzlauer, quality control is an integral part of the entire production process from procurement and production to packaging and delivery. Our production sites in Austria and Canada are ISO 9001 and FSSC 22000 certified. Jungbunzlauer guarantees high-quality products that conform to all international ingredient and technical specifications for citric acid and its salts. We supply citric acid in accordance with all major pharmacopoeias and food regulations (USP, FCC, Ph.Eur., EU Regulations, etc.) in their latest version.

As a supplier to the food industry, Jungbunzlauer meets the strict food and ingredient safety requirements specified by the Hazard Analysis Critical Control Points (HACCP) programme. This is a systematic procedure used to identify those process points where control is crucial to minimise risk factors. Jungbunzlauer has identified – and taken steps to counter – all potential hazards that exist in raw materials and during intermediate manufacturing stages. Application of HACCP standards to our production is the best way to ensure maximum product quality for our customers.

Jungbunzlauer is equally concerned with additional quality aspects that relate to customer needs. It is our guiding principle to deliver a combination of top product quality, prompt supply and comprehensive service at the best total cost.

The Jungbunzlauer business philosophy reflects a strong commitment to customer service. Our sales personnel, world-wide distribution network and highly skilled technical service support staff are at your service.



Renewable and Sustainable

Jungbunzlauer offers environmental, economic and social sustainability. Our citric acid is manufactured, packaged and delivered to our customers with respect to the environment. In that regard we continuously seek to decrease greenhouse gas emissions of our factories and we use carbohydrate raw materials from renewable resources as fermentation starting products. Our production facilities comply with strict safety, health and environmental criteria. Our plants in Austria and Canada have a certified commitment to the worldwide Responsible Care initiative. Furthermore, biodegradable by-products generated during the citric acid production process are used as fertiliser, animal feed or in the construction industry. Both Jungbunzlauer manufacturing sites operate state-of-the-art wastewater treatment plants with annual targets for controlling water consumption.

We invest in numerous energy and water saving programs which have resulted in a substantial reduction of energy consumption and improved processes over the last years. Jungbunzlauer routinely presents impressive results in respect to carbon dioxide emission reduction.

In response to customer demands, our European facility follows a non-GMO policy. We work exclusively with corn suppliers who can exclude the processing of genetically modified organisms (GMO) and we do not use genetically modified production strains during citric acid production. In Canada our GMO policy is in line with European, US and Canadian law and our products can be considered non-GMO in respect to labelling requirements.

Citric's Unique Properties

Citric acid is used in numerous consumer products, from foods to pharmaceuticals and detergents. Commanding over 70% of the world market for fruit acids, citric acid offers formulators a unique combination of benefits:

- Based on its unique chemistry with three carboxyl groups, citric acid is the most widely used acid in food applications.
- In the food and beverage industry, citric acid is the preferred acidulant due to its high solubility, pleasant tart taste and excellent flavour-blending characteristics.
- Thanks to its ability to form complexes with trace metals, citric acid is used as an antioxidant synergist. It stabilises colour, taste, flavour and vitamins in various food products including processed fruit, potatoes, vegetables, fish and meat products.
- As a buffering agent, citric acid and its salts help formulators to maintain optimum pH for maximum stability of active ingredients.
- Citric acid shows the widest buffering capacity (pH 2.5-6.5) of all organic acids, and therefore can give the food, personal care and pharmaceutical industries the flexibility needed to formulate optimal end products.
- As a builder in automatic dish washing detergents (ADWD) trisodium citrate is a potent replacer for phosphates and hence substantially contributes to alleviate eutrophication (excessive growth of plants and algae in water bodies).



Citric acid's unique properties can also be applied over a broad range of industrial applications. The cleaning, construction, textile and paper industries have taken advantage of citric acid's outstanding chelating ability, as well as its non-toxicity to pioneer new uses for

citric acid and citrates. Be it metal plating, the desulphurisation of flue gas, the application as a green binder in composite insulation material, oil recovery or the decontamination of radioactive nuclear reactor materials – citric acid is likely to be involved.



Jungbunzlauer Group

Jungbunzlauer is represented in all major markets. Our global network of sales companies and distributors covers more than 130 countries.

EUROPE

AUSTRIA – Vienna/Pernhofen
FRANCE – Marckolsheim
GERMANY – Ladenburg
NETHERLANDS – Papendrecht
SWITZERLAND – Basel

AMERICA

CANADA – Port Colborne
USA – Boston
MEXICO – Mexico City

ASIA

INDIA – Mumbai
SINGAPORE – Singapore
JAPAN – Tokyo



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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