



Gluconates

in food applications

Jungbunzlauer

*From nature
to ingredients®*

Gluconates

Multifunctional ingredients for better tasting food products

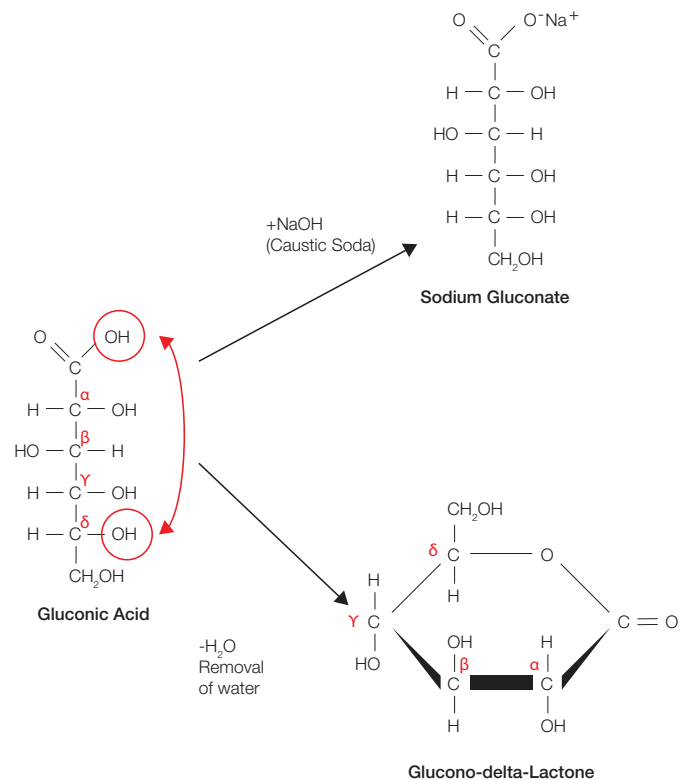
Jungbunzlauer Gluconates are versatile ingredients for food applications. Naturally occurring in fruit, honey, kombucha, tea and wine they can also be produced by fermentation of renewable raw materials and are sustainable, readily biodegradable and safe products. The product group for food applications consists of gluconic acid, glucono-delta-lactone (GdL) and sodium gluconate.

Product	Appearance	Grade	Quantities
Gluconic Acid (E574)	Colourless to light yellow liquid	50% solution	250 kg drums 1250 kg IBCs
Glucono-delta-Lactone (E575)	White crystalline powder	Three different granulations: F8025 / F5010 / F2500	25 kg bags Big bags
Sodium Gluconate (E576)	White crystalline powder	Two different granulations: granular/powder	25 kg bags Big bags

Product characteristics

Glucono-delta-lactone (GdL) is a neutral cyclic ester of gluconic acid. The acid is produced by aerobic fermentation of a carbohydrate source such as glucose syrup derived from maize. After fermentation it is purified and crystallised. When added to an aqueous solution, GdL dissolves rapidly. Then it hydrolyses progressively to gluconic acid and the taste changes from slightly sweet to mildly acidic. It is GdL's gentle acidification and mild taste that set it apart from other acidulants and favour its use in applications requiring a controlled decrease of pH and/or a neutral flavour profile.

Jungbunzlauer sodium gluconate is the neutral sodium salt of gluconic acid. It is commercially available as a non-hygroscopic crystalline powder with high solubility in water and a sodium content of approx. 10.6%.



Jungbunzlauer Gluconates in food applications

Beverages

Thanks to their unique properties, gluconic acid, GdL and sodium gluconate are the ideal choice as potent taste improvers for the beverage industry.

Compared to the intensive taste of standard acids such as citric, malic and lactic acid, gluconic acid has a slightly sweet, mild acid taste with a persistent effect on the tongue. GdL, the dry form of gluconic acid, is also available. Its mild acid taste harmonises very well with ice tea, cola, citric and exotic fruit aromas.

Sodium gluconate can reduce the bitterness of high-intensity sweeteners (HIS) like stevia, as well as minerals and caffeine. Additionally, it can mask off-notes or the aftertaste of artificial intense sweeteners like saccharin and aspartame, enabling them to be widely used in low- and mid-calorie soft, sport or energy drinks. The unique properties of sodium gluconate qualify it as an alternative choice for healthier and better tasting beverages.

Bakery

The combination of GdL and sodium bicarbonate is a great alternative leavening system to the traditional yeast fermentation. GdL belongs to the group of slow leavening agents as the rising is based on the progressive hydrolysis of GdL to gluconic acid when water is added to the dough mix. The gluconic acid then reacts with sodium bicarbonate for a continuous release of carbon dioxide.

Furthermore GdL can be used as a sodium-free leavening agent to replace sodium acid pyrophosphate (SAPP). Simply replacing SAPP by GdL reduces the sodium content of muffins by approx. 30% and eliminates the soapy aftertaste caused by SAPP.

GdL also makes it possible to adjust the pH in the baked product and thus to prolong its shelf-life.



Tofu

Tofu, a coagulated soy milk, is a traditional food in Asia. In Japan, the traditional coagulant for tofu is Nigari (which contains mainly magnesium chloride), but GdL is the preferred coagulant in silken tofu, a tofu with a smooth texture similar to yoghurt and a high water content. The coagulation process takes place in individual selling-size containers, i.e. directly in the packaging.

For a silken tofu with a firmer texture, the combined use of GdL with Nigari, calcium sulphate or calcium chloride is possible.

Another application of GdL is in bean curd, a popular food in China.

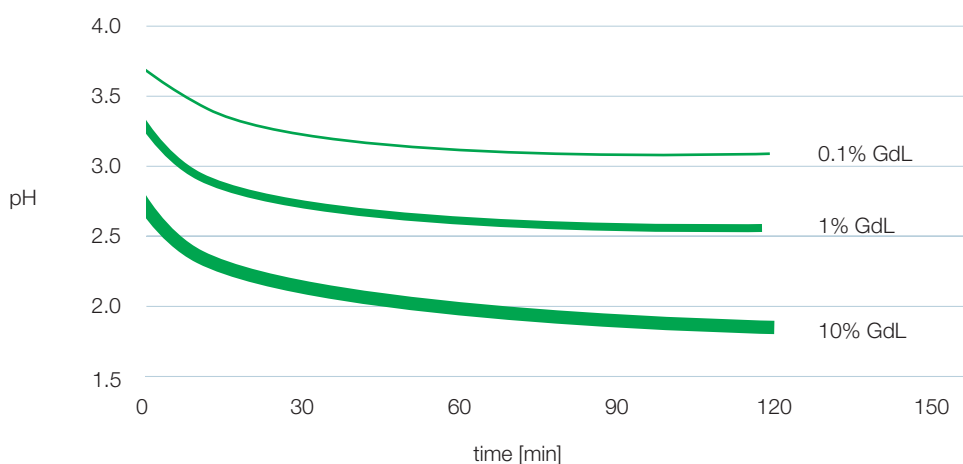


Dairy

Many production processes in the dairy industry require a slow pH decrease during manufacturing. In contrast to microbiological acidification, GdL can be added to milk at almost any temperature and it allows excellent control and reproducibility of pH reduction. Unlike other edible acids, GdL does not cause microfloculation of casein or organoleptic changes in dairy products.

Because it ensures a shorter total production time, constant quality of the final product, higher yields and a prolonged shelf-life, GdL F5010 has become a preferred acidifier in the manufacturing of feta-type cheeses, cottage cheese and mozzarella. Other uses include standardisation of the pH of milk used for cheese production and in acidified milk drinks.

Hydrolysis of GdL in water at 25°C – variation of pH with respect to time



Meat

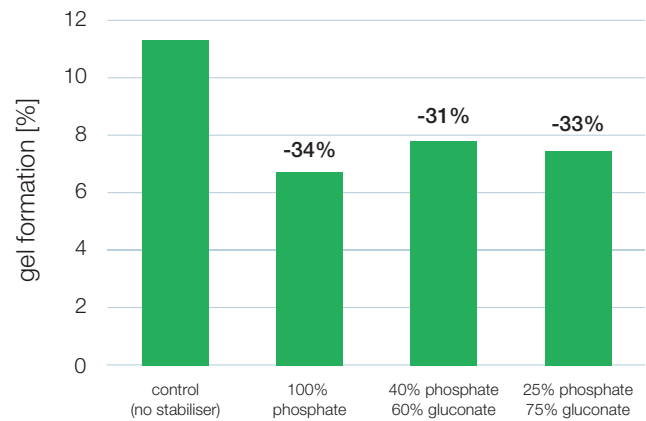
Acidification is essential for the coagulation of meat proteins in the production of raw sausages. Either food acids or starter cultures can be used for this purpose. The main advantage of acidification using GdL is that it is a fast, reproducible and well-controlled production process, resulting in a shorter ripening time.

From a sensory point of view, any acidic taste produced by GdL in raw sausages is easily masked by the addition of spices.

Most cooked sausages are cured to develop the characteristic red colour. GdL promotes the reaction of nitrite with meat haemoglobin at a dosage level of as little as 0.1 to 0.2%, creating the stable red colour characteristic of cured meat products. By lowering the pH using GdL, the formation of nitrous acid is accelerated.



Gel formation in frankfurter sausages without and with 0.3% stabiliser



Sodium gluconate can also act as a stabiliser in meat products, especially in emulsion-type sausages such as frankfurters. Here, it leads to an increase in the ionic strength and causes the muscle proteins to swell and unfold. As a result, the water-binding capacity increases, with a positive effect on firmness and sliceability.

In addition, sodium gluconate is a good alternative to phosphates, which are increasingly controversial. Trials have shown that partial replacement of phosphates with sodium gluconate (up to 60%) improves perceived quality. No deficiency in terms of colour or taste was perceived when phosphates were partially replaced with sodium gluconate (up to 60%).

Sea food

GdL helps inhibit enzymatic browning in sea food by chelating metal ions which enzymes need for their activation. It can therefore replace sulphite as antioxidant. Combining GdL with sulphites in the pre-freezing dip of frozen shrimps or in the blanching brine of canned shrimps makes it possible to substitute EDTA and reduce sulphite level by 50-90%. GdL is also used in the canning brine of canned shrimps both as a mild acidulant and as a sorbate and benzoate preservative agent enhancer. It further allows reduction of the salt level of the canning brine by 60-80% without loss of shrimp firmness. Thus the shrimps are healthier and have an improved clean shrimp flavour, closer to that of the fresh product.

Replacing up to 90% of the acetic acid content of marinated fish products like rollmops or Matjes herring with an amount of GdL that achieves the same pH as with vinegar alone improves taste while maintaining microbiological stability.



Sauces and dressings

Gluconic acid (or GdL as dry form) is a multifunctional substance that can replace up to three different ingredients of salads, dressings and sauces: the acidifier, the chelating agent and, to some extent, the preservative. It adds value and safety to these products by improving their taste, extending their shelf-life and reducing the use of preservative agents. Gluconic acid is a metal chelating agent for Fe^{3+} and Cu^{2+} ions which can prevent the oxidation of fatty acids in emulsions.

Convenience food

The preparation of pasta and rice in a solution containing GdL not only potentially extends the shelf-life of the products by lowering the pH, it also improves appearance and minimises carbohydrate loss during cooking.



Legal aspects and certifications

Gluconic acid, GdL and sodium gluconate are permitted as “quantum satis” food additives in Europe. They meet the purity requirements of the European Union and of the Food Chemicals Codex (FCC), and are certified Kosher and Halal. All Jungbunzlauer gluconates are suitable for vegetarian and vegan diets. Since they contain no gluten they are suitable for gluten-free products.

Jungbunzlauer Gluconates are produced in a state-of-the-art, ISO 9001 and FSSC 22000 certified factory in Marckolsheim, France.

- ✓ Quantum satis
- ✓ Purity requirements of EU and FCC
- ✓ Kosher
- ✓ Halal
- ✓ Gluten-free
- ✓ Vegan

Overview of major food applications of gluconates

	Gluconic Acid, food grade	Glucono-delta-Lactone	Sodium Gluconate, food grade
Beverages	Taste / acid profile	Taste / acid profile	Bitterness inhibitor, off-taste masking
Bakery		Leavening agent	
Tofu		Coagulant	
Dairy		Acidifier, coagulant, replacement of starter cultures	
Meat		Curing agent, replacement of starter cultures	Phosphate replacement, stabiliser
Sea food	Acidifier, preservation, mild taste	Replacement for sulphites, acidifier, preservation	
Sauces and dressings		Acidifier, chelating agent, preservation	
Convenience food	Lowering pH, preservation, mild taste	Preservation, lowering pH	



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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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