

NovaSOL® DC/DS Product Family

Innovative Preservation



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Sorbic- and benzoic acid have long and extensively been used as preservatives in the food industry. Their effectiveness strongly depends on the pH-value of the food and diminishes distinctly above pH 4. Above pH 6 there is practically no effect anymore.

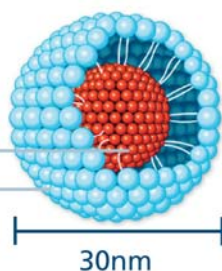
The new NovaSOL® DC/DS product family enables these preservatives to be applied in totally new dimensions.

- **pH-independent performance in the pH range 1.0 – 7.0:** The effectiveness of sorbic- and benzoic acid so far has been linked to the adjustment of a certain pH-value. Neither substance is active at a neutral pH and exert no or only a marginal protection. The patented NovaSOL® formulations, however, offer full preservation across the entire pH range and, hence, broaden the application spectrum enormously.
- **Application on the surface:** Micelles with a diameter of 30 nm only are loaded with the preservatives. They form a superior transport system, distributing them evenly throughout the surface of the food, protecting it entirely. Yeast and molds have no chance of growing.
- **Significantly higher solubility:** Unlike with the conventional forms of sorbic- and benzoic acid, the NovaSOL® DC/DS products allow for effective concentrations of the preservatives because of a 20 to 30 fold solubility. No crystallization, which would deactivate the preservatives, takes place.

NovaSOL® Product micelle

Core (Benzoic-/sorbic acid)

Shell



Applications

NovaSOL® solubilisates of the DC/DS product family have a broad application spectrum. This includes applications on the surface (NovaSOL® DC series) of, for instance

- raw sausage/bacon
- dried meats
- Matured cheese (cheese rind)
- Machinery and accessories

In addition the NovaSOL® products exert their preserving effects inside foods (NovaSOL® DS series) such as

- mayonnaise, dressings
- soups, dressings
- desserts
- syrups
- fine bakery, baked goods
- milk and cream substitutes
- ice cream
- chewing gum
- pH neutral drinkable dietary supplements
- cosmetics
- pharmaceuticals

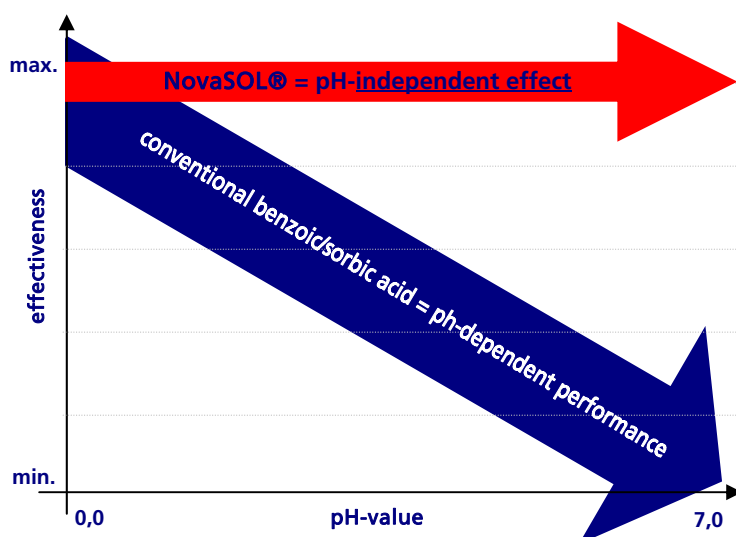


NovaSOL® DC/DS

The effectiveness of the NovaSOL® products has been confirmed by reputable food experts and institutes

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Correlation between pH and effectiveness

NovaSOL® DC/44, a product of the DC/DS product family, is a cost effective high performance preservative for the surface treatment of cheese and meat products. Production equipment and rooms can also be treated. NovaSOL® DC/44 is both water and fat soluble, mechanically, thermally and pH stable and effective in neutral pH areas. It is added to water or dipping baths. The meat products or cheeses to be treated can either be dipped or sprayed. Usually this has to be done only once.

	Conventional Form	NovaSOL®	Factor
Benzoic acid	3.500	108.000	31
Sorbic acid	1.650	36.000	22

Comparison of the maximal solubility in water
(at room temperature)

NovaSOL® product family

We have adapted the NovaSOL® products to the individual requirements of various application areas:

- NovaSOL® DS = "DuraSafe".
Solutions for the application inside
- NovaSOL® DC = "DuraCoat".
Solutions for the application on surfaces not intended to be eaten.
- Both water and fat soluble
- 5 produkt versions are available*):
 - o NovaSOL® DS/4 (4% sorbic acid)
 - o NovaSOL® DS/44 (4% sorbic acid / 4% benzoic acid)
 - o NovaSOL® DC/44 (4% sorbic acid / 4% benzoic acid)
 - o NovaSOL® DS/12 (12% benzoic acid)
 - o NovaSOL® DC/12 (12% benzoic acid)

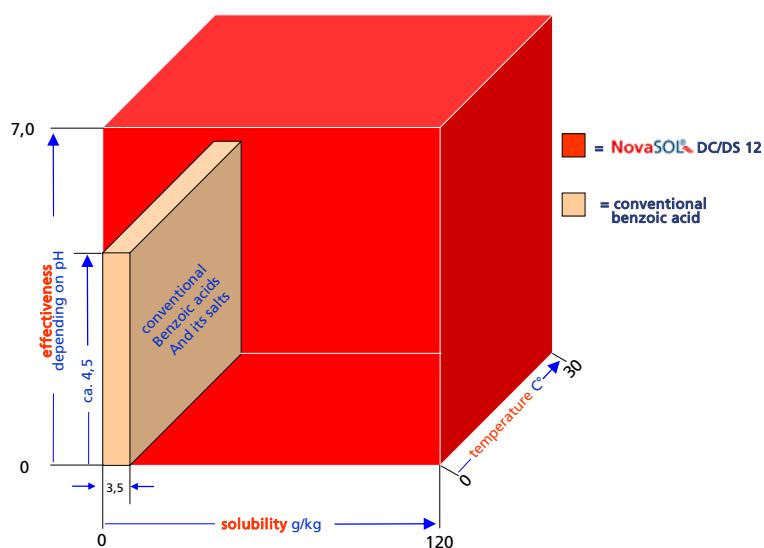
The relevant regional regulations and nutrition legislation have to be taken into account.

*) All products are also available in an antifoaming version.



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Comparison with conventional benzoic acid / its salts

Products from the NovaSOL® DC/DS family develop their germ inhibiting effect inside foods and drinks too. The solubilized preservatives readily dissolve in the aqueous phase of the foods where yeasts and molds grow. Since they are inside micelles, they are not at all affected by the pH-value outside the micelles. As a result they are always present in their active, undissociated state.

For the application on the surface the following dosages are recommended:

	Application	Recommended dosage
NovaSOL® DC/44	Outside application against yeast and molds	5% in water bath. 2-3% in dipping bath
NovaSOL® DC/12	Outside application against yeast and molds	3-4% in water bath 1-3% in dipping bath

For the application inside the following dosages are recommended:

	Application	Recommended dosage
NovaSOL® DS/44	Inside application against yeast and molds	0,1 – 0,2%
NovaSOL® DS/4	Inside application against yeast and molds	0,2 – 0,3%
NovaSOL® DS/12	Inside application against yeast and molds	0,08 – 0,1%

Presentation

NovaSOL® DC/DS products are crystal clear, liquid formulations flüssige („Solubilisates“)

- Kosher
- Halal
- GMO-free



Declaration

The declaration of this product family depends upon the respective application.

- On non-edible casings or cheese rind: no declaration necessary
- On edible casings or cheese rind or in case of inside application E202/E211 and the E-number of the emulsifier has to be declared



Documentation & samples

On request we provide you with

- Product Data Sheet
- Safety Data Sheet
- Studies and analysis
- Samples

Innovative Preservation



AQUANOVA is a leading supplier of innovative and versatile formulations of food and cosmetic ingredients, nutrients and pharmaceutical actives with superior properties providing new application opportunities. AQUANOVA develops and produces nano structured liquid solubilisates (product brand "NovaSOL") utilizing its proprietary technology, and in close cooperation with renowned scientists. The solubilisates consist of nano-sized micelles with a diameter of 30 nm only, which are thermally, mechanically and pH stable, even in gastric acid. Owing to the special properties of these product micelles, the solubilisates allow for the development of novel innovative and pioneering dietary supplements, functional foods and beverages, cosmetic products and pharmaceuticals. The absorption (bio-availability) of the active substances from the solubilisates (product micelles) and hence the efficacy, is significantly increased and optimized. In addition the solubilisates exhibit unique technical features and benefits such as superior antioxidative capacity for essential oils or pH-independent function of food preservatives. The company's headquarter is located in Darmstadt (near Frankfurt), Germany.

AQUANOVA AG

Birkenweg 8-10
64295 Darmstadt
Germany

Phone: +49 6151 669 69 - 0
Fax: +49 6151 669 69 - 29
E-Mail: agt@aquanova.de
Internet: www.aquanova.de

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