BioAmber
CHEMISTRY INSPIRED BY NATURE

Bio-Based Solutions for Flavors, Food, and Beverage

Bio-Based Succinic Acid (BIO-SA™) and Disodium Succinate

Enhance Food Naturally

BioAmber® is one of the leading producers of bio-based ingredients of natural origin. Bio-Succinic Acid (**BIO-SA™**) and its sodium salt, **Bio-Based Disodium Succinate**, are natural food and flavor ingredients. Produced by fermentation of renewable carbohydrates, they are sustainable, and readily GRAS (Generally Recognized As Safe).

Traditionally, Succinic Acid, derived from Maleic Anhydride, has been incorporated into flavors and foods. BioAmber offers alternatives to food and beverage customers who want to replace artificial additives with natural ingredients in order to provide a clean label to the consumer.

BIO-SA™ and **Bio-Based Disodium Succinate** can be multifunctional ingredients for the following potential applications:

- Flavor Enhancers
- Salt Reducers
- pH Regulator/Acidulants
- Preservatives
- Chelating Agents
- Emulsifiers

Flavor Enhancement

BIO-SA™ provides a salty, savory, meaty taste and can enhance the umami sensation- the recognizable savory flavor common in Asian food. As a flavor enhancer, it makes the mouth water in snacks, beverages, soups, dressings, condiments, dairy, canned seafood, and meat products like sausages. It also prolongs the flavor, providing a lingering taste.

BIO-SA™ is a natural alternative to other flavor enhancers, such as Monosodium Glutamate, Disodium Inosinate and Disodium Guanylate (I&G) and Hydrolyzed Vegetable Proteins and can assist in the reduction of sodium chloride salt.

Bio-Based Disodium Succinate is a neutralized derivative of **BIO-SA™**. It can be used independently as a seasoning agent or with salt, MSG or I&G. With **Bio-Based Disodium Succinate**, deliciousness and relish are multiplied and deepened. It can also soften other stimulating strong tastes, such as salt, vinegar and other acids. Due to its good water solubility and high penetration, effects are well accelerated. The anhydrous powder makes it ideal for blending in dry seasonings.

There is a perfect solution for your flavor and food ingredients. Naturally.
BioAmber produces it sustainably and at commercial scale.

BioAmber Inc., 3850 Annapolis Lane North, Suite 180, Plymouth, MN 55447 • Phone: 763-253-4480 • www.bio-amber.com

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Additional Potential Applications:

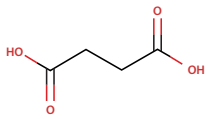
BIO-SA™ is a natural choice as an acidulant, for the reduction of the pH. Serving as a buffering agent, it can be used to maintain or establish pH.

Succinic Acid can also be considered for chelating functions to minimize oxidation, and reduce color and taste changes or as an emulsifier.

Specifications

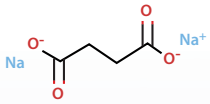
BIO-SA (Succinic Acid)

Analysis	Specifications
Molecular weight	118.09
CAS #	110-15-6
Appearance	White crystalline powder. Odorless, characteristic acid taste.
Particle Size	150 µm – 800 µm
Melting Point	186°C-190°C
Water content	≤ 0.5%
Assay	≥ 99.0% (Titration NaOH)
Other Organic Acids	<0.5%
Total Heavy Metals	10 ppm max.



Bio-Based Disodium Succinate (Anhydrous Grade)

Analysis	Specifications
Molecular weight	162.05
CAS #	150-90-3
Appearance	White crystalline powder. Odorless, characteristic acid taste.
Identification test	Titration by $HClO_4$
Particle size on 35 mesh/38T/500 µm	10 max
Water content	≤ 2%
Assay	≥ 98.0%
pH	7.0 ~9.0
Sulphate	0.019% max.
Total Heavy Metals	10 ppm max.



BIO-SA™ and Bio-Based Disodium Succinate Certifications

Certificate of Naturalness

GMO-Free Certification

Kosher Certification

USDA Certified Bio-Based Product (**Bio-SA** only)

BioAmber's bio-based succinic acid is registered under REACH (01-2119896114-34-0001). BioAmber's food grade succinic acid meets the requirements of FCC Monograph Specifications 7 supplement. Succinic acid is GRAS (Generally Recognized As Safe) (FEMA # 4719).

Our Value Proposition:

BioAmber offers customers choice and formulation flexibility for natural food ingredients. With a European plant in production since January 2010, and additional larger scale facility under construction in Sarnia, Canada, **BioAmber** is a proven partner working with market leaders to develop value-added, cost-competitive products. Our product platform creates a foundation for customer innovation in a broad range of applications and markets, offering superior functionality and performance with a better environmental footprint.

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