Palatinose™ in beverages

Smart formulations to go the distance with sports drinks

Sports drinks represent a growing market and are playing an increasingly important role. Today’s athletes as well as active people are eager to learn more about the different types of drinks that are available and that can help improve their overall performance. To supplement their training regimen, they look for sports drinks that provide them the energy to go even further in their sport. Carbohydrates are essential for sports and exercise performance.

Palatinose™ can be included in all kinds of beverages without any changes in the production processes. Its acid and temperature stability result in a longer shelf life and more specifically, Palatinose™ can support a better rehydration after exercise. Its low hygroscopicity prevents powder drinks from lumping and its taste and mouthfeel closely resemble the popular sweetness profile of sucrose, thus providing a natural, sugar-like taste and sweetness.
Matching today’s athletic expectations – using the full potential of functional carbohydrates

Carbohydrates are essential for sports and exercise performance. According to modern dietary guidelines (WHO), an average person should obtain about 55 to 60 percent of daily energy from carbohydrates. **Athletes rely on carbohydrates because they provide the essential source of energy for physical performance.**

Most popular sports drinks contain high glycaemic carbohydrates like maltodextrin, glucose syrup and sucrose. These release glucose into the bloodstream at a fast rate, aiming to maximise carbohydrate utilization. Upon intake before sports, these drinks can result in large spikes and drops in blood glucose levels – not an ideal situation for athletes to start their exercise and the valuable contribution of fat utilization in the fuel mix is suppressed to a great extent also during exercise.

**Low glycaemic carbohydrates, such as Palatinose™ are exciting alternatives as they deliver a balanced release of energy over a longer period of time.** Based on scientific research, Palatinose™ has been shown to have a sustained effect on normal blood glucose levels compared to other fully digestible carbohydrates.

**Palatinose™ – breaking the boundaries between sweeteners and functional carbohydrates**

Palatinose™ is a pure, white crystalline carbohydrate purely based on sucrose from the sugar beet. It is 100 % vegan, kosher, halal and non-GMO. In terms of its chemical structure, its applications and its nutritional benefits, Palatinose™ is a unique carbohydrate.

Palatinose™, also generically known as isomaltulose, is derived from sugar beet. Just like sucrose, it consists of one glucose and one fructose unit. The difference lies in the bond between these parts. With its α-1,6-glucosidic bond, Palatinose™ is a more stable molecule compared to the α-1,2-glucosidic bond found in sucrose. This strong binding explains why Palatinose™ offers a more steady source of energy when compared to sucrose, for example. It can simply not be broken down as fast as sucrose.

Due to its specific molecular bond Palatinose™ is fully absorbed but slower than commonly known sugars or carbohydrates. It therefore offers the full caloric value of carbohydrates (4 kcal/g) but in a balanced and longer lasting way.
How exactly can Palatinose™ help athletes go the distance?

What role can the carbohydrate choice with sports drinks play?

Two aspects are important to understand the interplay in this. Firstly, carbohydrates consumed with foods or sports drinks are used first in the energy supply to the muscle, simply because this allows the body to save its own carbohydrate and fat reserves for times when no “external” sources are available.

Secondly, the rate of glucose supply from those drinks determines the extent to which mobilisation and utilisation of internal sources are suppressed. This means that carbohydrates providing fast glucose to the body lead to a more extensive suppression of fat utilisation. And here, the advantages of Palatinose™ become evident: The “slow release” carbohydrate Palatinose™, which provides its carbohydrate energy more steadily over a longer time, allows the body to maintain a higher level of fat utilisation in the fuel mix to the muscles. In endurance exercise, a higher contribution of fat oxidation is said to have a glycogen sparing effect and thus a beneficial effect to enhance endurance performance.

Palatinose™ can play a decisive role in weight management.

While playing sport or taking part in exercise, athletes can derive a dual benefit from the functional carbohydrate – energy in the form of glucose is available for a longer period during endurance sports, while a greater proportion of energy can be released from body fat. This prevents total depletion of carbohydrate reserves, enhances endurance and contributes to an athletes’ performance when active.

Palatinose™ – A natural option for athletes and weekend warriors

Palatinose™ is derived from pure beet sugar and is also found in honey and sugar cane as a natural component. With a mild sweetness, its sensory profile is very similar to sugar, without any aftertaste. At the same time, sports drinks produced with Palatinose™ maintain a constant osmolality even in acidic and pasteurised beverages – no matter if they are isotonic, hypotonic or hypertonic. This means the amount of solute particles of salt, minerals or protein remains stable during the complete shelf life. With Palatinose™, new and modern concepts of a sports drink are possible, providing prolonged energy with a mild and natural sweetness.
Product development with Palatinose™

Palatinose™ as ideal ingredient for beverage innovation

In addition to the nutritional benefits, the functionality of Palatinose™ allows the development and composition optimisation of a wide array of beverages, such as:

- Functional, sport and energy beverages
- Wellness drinks and ice tea
- Enhanced fruit juices and juice based drinks
- Enhanced water, near water and aqua plus concepts
- Dairy-based drinkable yogurts
- Protein-based beverages
- Non-alcohol beer/ malt-based beverages

Sweet functionality

An important functionality in all food and beverage is taste: Palatinose™ comes along with a sucrose-like natural sweet perception without any aftertaste. Its sweetening power is about 50% that of sucrose, possible to be adjusted by means of intense sweeteners (Stevia, Sucralose etc.) to any required sweetening level*.

Dependent on the application, a combination of Palatinose™ with other carbohydrates can also result in improved sweetness as well as taste and texture of the final product.

For example, Palatinose™ Acesulfame K mixtures showed a sweetness profile and perception matching closest to that of sucrose when compared with alternative combinations of intense and bulk sweeteners**.

In combination with functional ingredients like omega-3-fatty acids, EGCG and others Palatinose™ seems to mask off-taste and -odour.

Exemplary sweetening concepts

| Palatinose™ 99.97% | Sucrose 0.03% | 10% Palatinose™ solution and HIS to achieve an iso-sweetness of sucrose (10% solution) |
| Palatinose™ 99.95% | Stevia 0.05% |  |
| Palatinose™ 99.986% | Stevia 0.014% | 6% Palatinose™ solution and stevia to achieve an iso-sweetness of HFCS (6% solution) |
| Palatinose™ 99.930% | Stevia 0.026% Acesulfam K / Aspartam 0.024% (1:1) | 4% Palatinose™ solution and HIS to achieve an iso-sweetness of sucrose (8% solution) |
| Palatinose™ 99.915% | Stevia 0.059% Acesulfam K / Aspartam 0.026 % (1:1) | 3% Palatinose™ solution and HIS to achieve an iso-sweetness of sucrose (8% solution) |

* Total Rebaudioside A content: 95%
EGCG: Epigallocatechin-3-gallat (Polyphenole; Green Tea Extract) | HFCS: High fructose corn syrup | HIS: High intensity sweetener

** (Innovations in Food Technology, 11/2006)
**Solubility and stability**

Palatinose™ offers a good solubility (29%; 20°C/aqueous solution) and a very high stability under acidic conditions even at high shelf temperatures.

**Density and viscosity**

Density, specific volume and viscosity of Palatinose™ aqueous solutions are just the same as equal concentrated sucrose solutions. Also the refractive index of Palatinose™ solution is identical to that of sucrose. Thus, refractometry can be easily applied for determination of Palatinose™ concentration in water.
Palatinose™ improves sports beverages: Hypotonic – isotonic – hypertonic

Many sports drinks with a pH value of ~3 currently on the market contain sucrose which in an acidic environment hydrolyzes into glucose and fructose. That means the number of osmo-active particles increases and the isotonic balance may be destroyed.

The Palatinose™ benefit: Unlike sucrose Palatinose™ is not easily hydrolyzed by acids, thus it is ideal for iso- or even hypotonic beverage concepts, as it helps to maintain the osmolality of the product.

**Formulating a Hypertonic or a hypotonic rehydration drink**

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Flavoring and coloring corresponding to supplier’s recommendations.
Visit us at IFT.

At IFT New Orleans (21-24th June), BENEO will present its full ingredients range for a variety of technical and physiological benefits. To name a few technical benefits: improved shelf life, enhanced mouthfeel, brighter colours, sugar reduction, natural sweetness, better stability, easy processing and last but certainly not least: improved taste & texture.

Come visit us at IFT New Orleans at booth N° 4413 and find out more about using Palatinose™ in your beverage innovations.

Always at your side: Profit from our interdisciplinary expertise.

Our experts offer valuable insights. No matter if your question concerns physiology or process technology, if it is marketing related or if it is about legislation and regulations. With nutritionists, marketers, regulatory professionals, technical food engineers and a competent sales force throughout the world, there is always a BENEO expert that can help you. It’s the combination of advanced ingredients and specialist knowledge together with access to a global network of experts which makes BENEO a unique business partner.

The BENEO range of food ingredients includes specialty rice ingredients, functional carbohydrates, prebiotic fibres and vital wheat gluten. Learn more about the our BENEO nutrients online: www.beneo.com

Reference list
study by Berg/König and Arai
Berg/König, Freiburg University Clinic, Center for Internal Medicine’s Department of Rehabilitation, prevention and sports medicine, Germany, 2007.

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