

Applications using Malic Acid

Carbonated Beverages

Adding **Malic Acid** improves economies, especially in artificially sweetened products. Flavors are enhanced, allowing the use of less flavor additives, and the overall flavor profile is broader and more natural.

Non-carbonated Beverages

Malic Acid is a preferred acidulant for still beverages (fruit drinks, nectars, iced-teas, sports drinks, calcium fortified juices), because it enhances fruit flavors, improves pH stability, and masks the aftertaste of some salts.

Powdered Mixes

In iced tea, sports drink or fruit soup dry mixes, **Malic Acid** is preferred due to its rapid dissolution rate and flavor enhancement qualities. Since **Malic Acid** provides more sourness than Citric acid, less acidulant is required and unit weight can be reduced.

Low Calorie Beverages

In beverages containing intense sweeteners, less **Malic Acid** than Citric is required to achieve the desired sourness and flavor at a higher pH. **Malic Acid's** extended sourness masks sweetener aftertaste (see Taste Retention Chart) and its blending and fixative abilities give a balanced taste. In a study with 14-30 year olds, aspartame sweetened low-calorie soft drinks acidified with **Malic Acid** were preferred over those with Citric acid.

Ciders and Wines

For "alcoholic" apple ciders, **Malic Acid** is added to maintain a consistent "sharp" taste. In wines, malolactic fermentation improves the flavor profile of the wine.

Acidified "Dairy" Products

1. Whey-based protein beverages acidified with **Malic Acid** have enhanced fruit flavor and less noticeable whey flavor.
2. Fruit flavored milk drinks made with fruit juice and acidified with **Malic Acid** have improved flavor and palatability.
3. Coagulated soy-milk acidified with **Malic Acid** produces a yoghurt-like product.

Calcium Supplements and Calcium-fortified Beverages

In liquid calcium supplements, **Malic Acid** adds a tart and fruity flavor while controlling the pH. In calcium-fortified beverages, using **Malic Acid** in place of Citric acid prevents turbidity due to precipitated calcium citrate.

Confectionaries

Malic Acid gives an appealing tartness to hard, soft, tabletted and sugarless candies as well as chewing gum. Blending multiple acids creates unique tasting confections. For example, to prolong the sourness in candy or chewing gum, Citric acid is used for an initial sour boost, **Malic Acid** for a lingering sourness, and Fumaric acid to sustain the tartness even longer. **Malic Acid's** high solubility allows it be blended with cooled confections. Adding acids at the end of the candy making process minimizes sugar inversion.

Hard Candy

Malic Acid boosts sourness intensity and enhances fruit flavors. It has a lower melting point than other food acids - this means that it can be incorporated into the molten hard candy without added water - shelf life is increased since the initial moisture level in the hard candy is lower.

Soft Candy

In agar, gelatin or pectin-based candies such as jellies and gummies, **Malic Acid** is used to achieve a natural fruit flavor profile, proper gelling and good product clarity.



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Sugarless Confections

Malic Acid is preferred over Citric acid in this application because it enhances flavor, especially fruit flavors, and boosts sweetness. Blending the sorbitol solution during the heating process is made easier by adding **Malic Acid**.

Chewing Gum

Organic food acids combined with saccharin improve saliva stimulation in chewing gum. **Malic Acid** is preferred due to its flavor enhancement properties. Using blends of acids with different partition coefficients results in a sequential release of acid - this creates prolonged juiciness and flavor during chewing.

Fruit Preparations and Preserves

Malic Acid enhances fruit flavors and creates a more natural flavor profile in jams, jellies, and fruit preparations. **Malic Acid** stabilizes pH to control pectin gel texture due to its strong buffering capacity at the pHs used for pectin gels. Fruit preparations are acidified with **Malic Acid** so that the fruit flavor stays strong, even when the fruit preparation is used in dairy products, frozen desserts or baked goods.

Desserts

1. Fruit preparations for frozen desserts show enhanced fruit flavour when **Malic Acid** is included
2. **Malic Acid** is an economical fruit flavor enhancer in sherbets and water ices.
3. In gelled desserts, **Malic Acid** enhances fruit flavors and helps stabilize pH to control gel texture.

Bakery Products

Bakery products with fruit fillings (cookies, snack bars, pies, and cakes) have a stronger and more naturally balanced fruit flavor when the fruit filling includes **Malic Acid**. Pectin gel texture is more consistent due to **Malic Acid's** buffering capacity.

Medical and Personal Care Products

In throat lozenges, cough syrups, and effervescent powdered preparations, **Malic Acid** enhances fruit flavor and can diminish the flavor impact of active components. As **Malic Acid** stimulates saliva flow, it can be used in tooth-cleaning preparations and mouthwashes. Germicidal compounds are used in combination with **Malic Acid** in soaps, mouthwashes, and toothpaste.

Acid-Based Facial Products

Malic Acid, an alpha hydroxy fruit acid, can be used in skin care products to rejuvenate and improve skin conditions.

Oil Field Applications

Demands for **Malic Acid** in the oil industry are rapidly increasing. The product is used to aid in the transfer of raw crude from the well to the refinery.