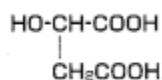


Characteristics of Fruit Acids

Malic Acid

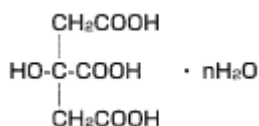
White crystal or crystalline powder. Widely contained in fruits and vegetables. It has mild and refreshing sourness. Widely used as acidulant and pH controlling agent for food.



MW	134.09
CAS No.	6915-15-7
1%pH	2.3
Solubility (20°C)	53.7

Citric Acid

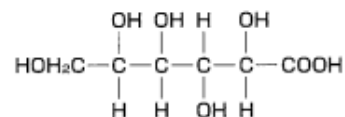
Colorless clear crystal, powder or lump. Widely exists in fruits and vegetables, especially, citrus. It has refreshing sourness and is most widely used as acidulant and pH controlling agent for food.



MW	Crystal (Monohydrate) 210.14 Anhydrous 192.12
CAS No.	Crystal (Monohydrate) 5949-29-1 Anhydrous 77-92-9
1%pH	2.2
Solubility (20°C)	59.0

Gluconic Acid

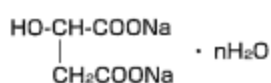
Colorless to light yellow clear and bright syrup. Contained in honey and jelly. It has mild and soft sourness. Used as acidulant, pH controlling agent for food, and an ingredient for health food with function of increasing Lactobacillus bifidus.



MW	196.16
CAS No.	526-95-4
1%pH	2.6
Solubility (20°C)	Immixture

Sodium Malate

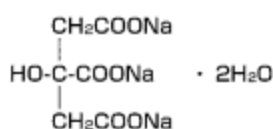
By replacing part of salt with Sodium Malate, salty taste is reduced. It reduces water activity and increases preserving effect. It is used for processed sea food and pickles. It also reduces salt from seasoning. With pH cushioning effect, it adjusts acid taste and produces mild taste.



MW	Trihydrate 232.10 1/2-hydrate 187.06
CAS No.	Trihydrate 64887-74-7 1/2-hydrate 676-46-0

Sodium Citrate

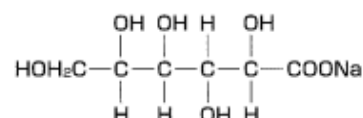
Used for controlling sourness, and as pH controlling agent and chelating agent. Used as emulsifier and stabilizer for drinking water and dairy products as well as sweetener and seasoning.



MW	Dihydrate 294.10
CAS No.	6132-04-3

Sodium Gluconate

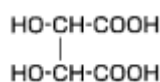
General usage as pH controlling agent and acidulant. Used also as chelating agent and as an ingredient of health food, by utilizing the function of increasing Lactobacillus bifidus. It also improves the flavor and smell of food.



MW	218.14
CAS No.	527-07-1

Tartaric Acid

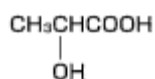
Colorless crystal or white fine crystal powder. Among fruits, grapes include a lot. It has sharp sourness. Similar to Citric acid and Malic acid, widely used as acidulant and pH controlling agent for food.



MW	150.09
CAS No.	87-69-4
1%pH	2.1
Solubility (20°C)	58.2

Lactic Acid

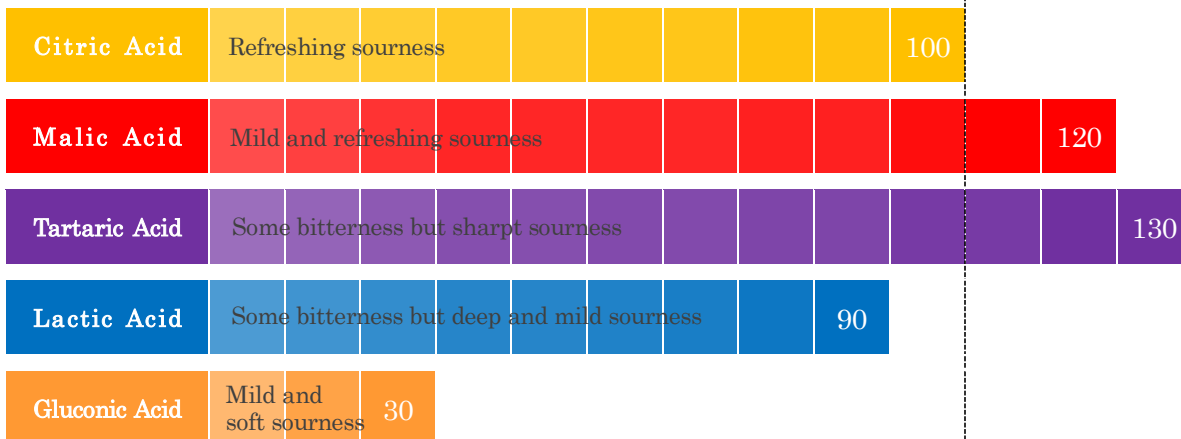
White to light yellow solid or colorless to light yellow bright and clear liquid. Known as the sourness of yogurt. It has deep and mild sourness and widely used as acidulant and pH controlling agent for food.



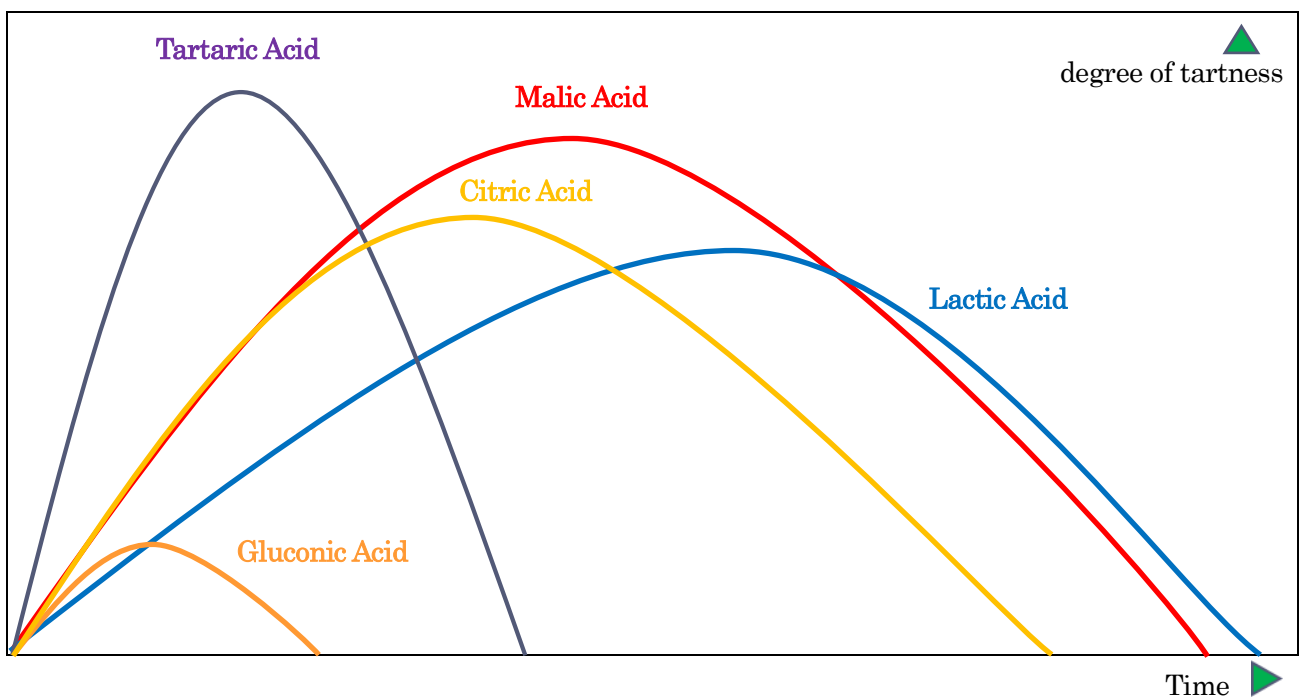
MW	90.08
CAS No.	50.21-5
1%pH	2.3
Solubility (20°C)	Immixture

Difference of the level of sourness among Fruit Acids

Difference when Citric Acid (anhydrous) is 100 for the level of sourness



Difference in taste time among Fruit Acids



Citric Acid	Similar to Malic Acid but sharper than Malic Acid
Malic Acid	Sourer than Citric Acid and the taste prolongs
Tartaric Acid	Quickly tastes sour and sharp.
Lactic Acid	The sourness increases mildly and prolongs longer than Citric Acid. Bitterness comes after.
Gluconic Acid	The sourness is weak but comes quickly and is sharp.