



Importance and applications of food Acidulants

Binod Kumar Bharti^{1*}, Sonia Kumari¹ and Jahangir Badshah²

^{1*} Assistant Professor cum Jr. Scientist, Sanjay Gandhi Institute of Dairy Technology (Bihar Animal Sciences University) Patna

² University Professor cum Chief Scientist, Sanjay Gandhi Institute of Dairy Technology (Bihar Animal Sciences University) Patna

<https://doi.org/10.5281/zenodo.7497929>

Introduction

Acidulants is a type of food additives. Acidulants are chemical compounds that give a tart, sour, or acidic flavour to foods and it also enhances the perceived sweetness of foods. Acidulants plays important role as a leavening agents and emulsifiers in some kinds of processed foods (Berry, 2001). Though the acidulants, it can lower the pH value and they also differ from acidity regulators. The food additives specifically proposed to modify the food stability or enzymes within acidulants. The main purpose of food acidulants is to control the acidity or alkalinity of a food system. The important acidulants are acetic acid in pickles and citric acid. Many beverages such as colas, are also contain acidulants like phosphoric acid. Sour candies are formulated with some acidulants as a malic acid (Erich Lück *et al.*, 2002). Other acidulants are also used in food production such as fumaric acid, tartaric acid, lactic acid and gluconic acid (Berry, 2001). The food constituents like fat, protein, carbohydrates, vitamins and minerals are strong interactions between food acidulants. The foods acidulants are used in the form of powder, granular and crystal. There are limitations for use of food acidulants as per food safety rules and also follows the good manufacturing practices. The classification, function and applications are discussed in this article.

Classification of Acidulants

List of common acidulants and its application

- i. **Acetic acid** –Its chemical formula is $C_2H_4O_2$. Its pH is 3.91. It is used as preservatives. It is also used to retard the growth of micro-organism by reducing pH. Acetic acid gives vinegar its sour taste and distinctive smell.
- ii. **Citric acid**- Its chemical formula is $C_6H_8O_7$. Its pH value is 3.24. It is used as nutrient enhancer. When food contains ascorbic acid then nutritive value is enhanced by addition of acidulants. Citric



acid is highly soluble in water. It is found in citrus fruits and it also gives sour taste. It is mainly added in fruit juices and jams.

- iii. **Ascorbic acid**- Its chemical formula is $C_6H_8O_6$. Its pH is 3.59. It is found in oranges and green peppers and gives a crisp, slightly sour taste, better known as vitamin C.
- iv. **Adipic acid**- Adipic acid is used as a viscosity and melting modifier. It is used to improve the melting characteristics and texture of cheese spread. Adipic acid is added in processed cheese, baking powder, edible oil etc.
- v. **Fumaric acid**- Its chemical formula is $C_4H_4O_4$. Its pH value is 3.19. It found in mushrooms, Icelandic moss and lichen. It is not found in fruits. Fumaric acid is used as a substitute for citric and tartaric acid. It enhances flavour and sourness.
- vi. **Mallic acid**- It is a naturally occurring in many fruits organic acid and also present in human metabolism (Krebs cycle), produced commercially by a synthesis. Its chemical formula is $C_4H_6O_5$. Its pH is 3.33. It is mainly found in apples and rhubarb and gives them their sour or tart taste. It is applicable in beverages, low alcoholic coolers and flavoured beers, confectionery.
- vii. **Lactic acid**- It is a naturally occurring in many fermented dairy, foods and human body organic acid. Lactic acid first isolated from sour milk. It is produced commercially by microbial fermentation of carbohydrate substrates. Lactic acid is commonly available in liquid form, clear colourless to pale yellow solution. Its chemical formula is $C_3H_6O_3$. Its pH value is 3.51. Lactic acid is found in various types of milk or fermented products and give them a rich tartness. It has specific sour taste and no strong smell. Lactic acid is well soluble in water. It is available in liquid and powder form. The main functions of lactic acid to flavour enhancer, pH control and microbial control in food.
- viii. **Tartaric acid**- It is also called racemic acid. The chemical formula of Tartaric acid is $C_4H_6O_6$. Its pH is 3.18. Tartaric acid is used as flavouring agents. It is mainly found in grapes and lime flavour beverage and gives them a strong tart taste. It is mainly added in some food like wine, chocolate products, jam, fruits juice etc.
- ix. **Phosphoric acid**- Its chemical formula is H_3PO_4 . Its pH value is 3.06. It is also known as orthophosphoric acid. Phosphoric acid reacts with protein to improve their emulsification and water binding capacities. It is used as a pH controlling agent. It is used in some cola drinks to give an acidic taste. Phosphoric acid is normally added in some food like butter, soft drink, fruit juice, cheese etc. The main functions of phosphoric acid to pH control, flavour enhancer and microbial control in food.



- x. **Tricalcium citrate**-It is used as a chelating agent and antioxidant synergist. The chelating agent is useful in retarding enzymatic browning of fruits and vegetables. Tricalcium citrate is added in some food like ice cream, evaporated and condensed milk, wine, jam, milk powder, processed cheese etc.
- xi. **Succinic acid**-It is a naturally-occurring dicarboxylic acid. Succinic acid is found in most fruit and vegetables. Traditionally, it is produced by catalytic hydrogenation of maleic acid and anhydride, can be also extracted from the fruits or produced by bioconversion. It is odourless, colourless, white crystalline solid that has a slightly bitter and acid taste, and is soluble in water.

Functions of Acidulants

There are various functions of acidulants in food. Some of the important functions are given below:

- i. Acidulants are commonly used as food additives in processed foods and beverage.
- ii. It imparts sour taste
- iii. It also adjusts the pH value.
- iv. It is used as food preservatives.
- v. It is used as a chelating agent.
- vi. It is an anti-oxidant synergist.
- vii. It enhances and modifies the flavours and sweetness of sugar.
- viii. It performs the functions of leavening agents and emulsifications in baked foods.
- ix. It is to control the gel formation and
- x. It maintains the viscosity of confections and gelatine desserts etc.
- xi. Food safety rules to use acidulants in food

Conclusion

Food Acidulants are mainly used to control the acidity and alkalinity of food system. Different types of food acidulants have different functional properties in food system. The food constituents like fat, protein, carbohydrates, vitamins and minerals have strong interactions between food acidulants. There are limitations for use of food acidulants as per food safety rules.

References

- Berry, S.K.. (2001). Role of acidulants in food industry. *Journal of Food Science and Technology*. 38. 93-104.
- Erich Lück and Gert-Wolfhard von Rymon Lipinski (2002). "Foods, 3. Food Additives" in *Ullmann's Encyclopedia of Industrial Chemistry*, Wiley-VCH, Weinheim.

