

BARTEK FUMARIC ACID

IN WHEAT & CORN FLOUR TORTILLAS —THE CHALLENGE OF KEEPING THEM FRESH

Historically, wheat flour tortillas were made with 4 basic ingredients—flour, water, shortening and salt; and corn tortillas were made from lime cooked corn masa flour.

Tortillas traditionally are eaten on the day of baking. Today, consumers do not usually have time to shop daily for their breads. To meet these new demands, tortillas have been reformulated to improve—production efficiency, product uniformity, shelf life and shelf stability.

FUNCTIONAL PROPERTIES OF SOME ADDITIVES USED IN TORTILLAS: *FOOD ACIDULANTS AND ANTIMICROBIALS HELP KEEP TORTILLAS FRESH*

Wheat flour and corn masa flour tortillas are prone to microbial spoilage due to their high water content. The moisture content ranges from 26-46%.

Antimicrobial Agents—Sodium and calcium propionates, as well as potassium sorbates are used alone or in combination to extend the tortillas' shelf life by inhibiting mold growth. Propionates and sorbates are most effective under acidic conditions when a high percentage of acidic molecules are undissociated.

Fumaric acid, an acidulant, is added to lower the tortillas' pH, to around 5.8, where the antimicrobial agents are still effective.

Acidulants—Because antimicrobial agents perform better at a lower pH, acidulants like **fumaric**, **malic** and citric acid are used to reduce pH. Research at Texas A&M University revealed that **fumaric acid** exhibited functional properties beyond its acidification abilities. **Fumaric acid** showed a reducing effect due to the double bond

configuration in its molecular structure. This double bond is not present in other common food acids.

Reducing Agents improve dough machinability in wheat flour tortillas. These ingredients break or block wheat gluten disulfide bonds. The decrease in the quantity of intact disulfide bonds results in a softer, more machinable dough. *Reducing Agents* used in wheat flour tortillas include L-cysteine, bisulfites, metabisulfites, and **fumaric acid**.

Reducing agents also improve the color of tortillas.

A pH range from 5.5-6.0 is suggested to produce optimum: tortilla color, leavening action, and enhanced effectiveness of antimicrobials.

Besides mold growth, **corn masa tortillas** have greater staling problems than wheat ones. Proteins in corn tortillas do not form a gel network like gluten and there is insufficient fat in corn masa to modify starch gelatinization. Hydrocolloids and gums help corn tortillas stay pliable and flexible.

As the corn tortilla's pH is related to the amount of lime used, corn tortillas have a neutral or slightly alkaline pH, (6.9-7.8). Acidulants like **fumaric acid** are needed to reduce the tortilla pH to 5.5-6.0, as most antimicrobials work more efficiently at pH 5.5-5.8.

According to research findings at Texas A&M University, the amount of **fumaric acid** generally required to decrease the tortilla pH to an effective level is 0.45% of corn flour weight and 0.24% of wheat flour weight.

Acidified tortillas containing antimicrobials have an extensive shelf life, up to 60 days.

WHY BARTEK FUMARIC ACID IN TORTILLAS

Synergism with Antimicrobial Agents

- ▶ Fumaric acid lowers tortilla pH, enhances effectiveness of antimicrobials.

Reducing function

- ▶ Fumaric acid improves dough machinability by blocking or breaking wheat gluten disulfide bonds.

Lower cost

- ▶ Fumaric acid is stronger than all other organic food acids.
- ▶ On a unit cost basis, Fumaric acid is more economical compared to other acids.

Better flavor stability

- ▶ Fumaric acid does not absorb moisture which degrades flavor ingredients in dry-mix products.

Nonhygroscopic

- ▶ Fumaric acid absorbs virtually no atmospheric moisture, it stays dry and free-flowing.

Non-caking

- ▶ Fumaric acid guards against moisture pick-up so dry-mix products will not cake or harden, even during high humidity storage conditions.

Stable

- ▶ Bartek Fumaric acid remains chemically stable under normal processing and can be stored indefinitely at room temperature under clean and dry conditions.

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