

# Technical Bulletin

## Fumaric Acid in Wheat Flour Tortillas

### Tortillas

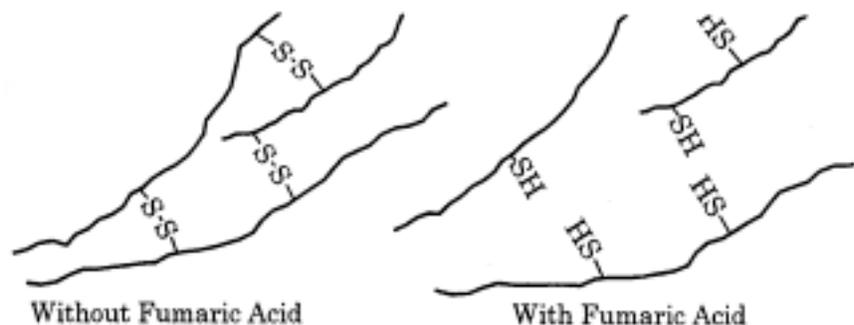
**Bartek Fine Granular Fumaric Acid**, when used in wheat flour tortillas, has the following benefits:

- Increases production rate
- Maintains a low ingredient cost
- Provides laminated texture (as a leavening acid)
- Extends shelf life
- Avoids moisture absorption

Each of these benefits is described below.

### Increases Production Rate

Fumaric Acid relaxes tortilla dough by breaking disulfide bonds between protein molecules, as shown in the diagram. The result: a more easily machined dough and faster production rates.



### Maintains a Low Ingredient Cost

Cost savings are realized with **Bartek Fine Granular Fumaric Acid** in three ways:

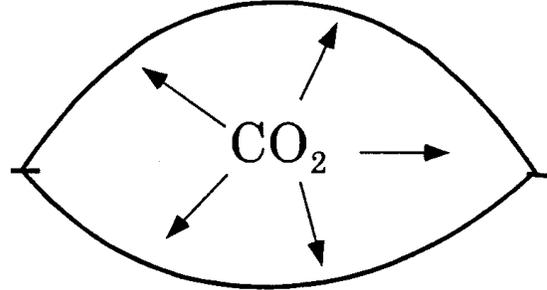
- Fumaric Acid costs less per pound than other granular acids.
- Fumaric Acid is a stronger acid than other granular acids, therefore less is needed.
- Replacement of baking powder with **Bartek Fine Granular Fumaric Acid** and sodium bicarbonate reduces the leavening cost by more than half.

## Provides Laminated Texture

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### **Bartek Fine Granular Fumaric Acid**

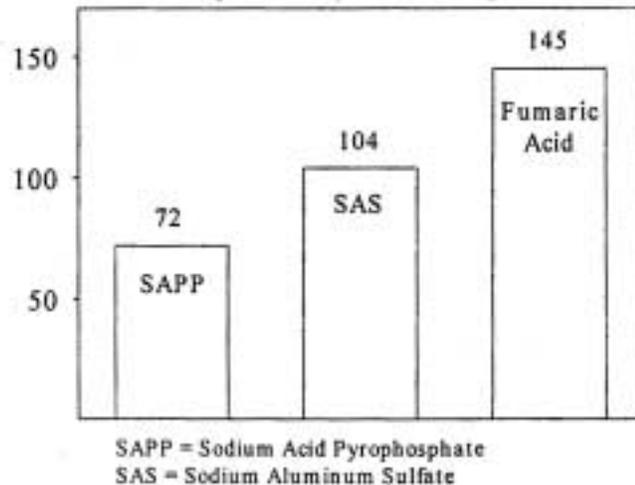
is a delayed action leavening acid. Larger particles dissolve during baking and generate CO<sub>2</sub> gas by reaction with sodium bicarbonate. Tortilla expansion during baking causes laminated texture.



Fumaric Acid is more powerful than other delayed action leavening acids, as shown in the graph at right. The neutralization value, on the Y axis, is the amount of sodium bicarbonate (in kg) neutralized by 100 kg of leavening acid.

The particle size of Fumaric Acid determines its rate of reaction as a leavening acid. Powder Grade Fumaric Acid reacts quickly because it dissolves quickly. **Bartek Fine Granular Fumaric Acid**, on the other hand, dissolves slowly and as a result functions well as a delayed action leavening acid.

Neutralization Value of Delayed Action Leavening Acids

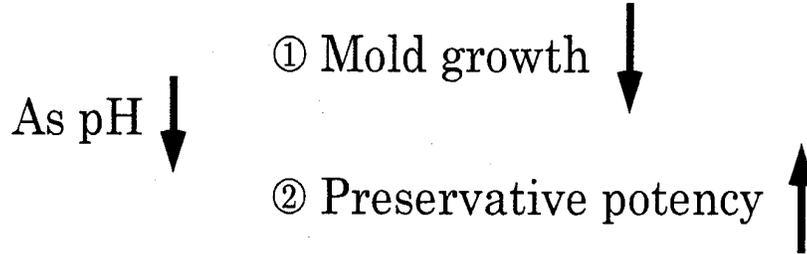


Baking powder, which contains baking soda (sodium bicarbonate), leavening acids, and starch, can be eliminated from the tortilla formula. Instead, use baking soda and **Bartek Fine Granular Fumaric Acid** at less than half the cost.

## Extends Shelf Life

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Fumaric Acid inhibits mold growth during tortilla storage by lowering the pH of the tortilla. Mold growth is slowed and preservatives become more effective at lower pHs.



How much is shelf life increased with Fumaric Acid?

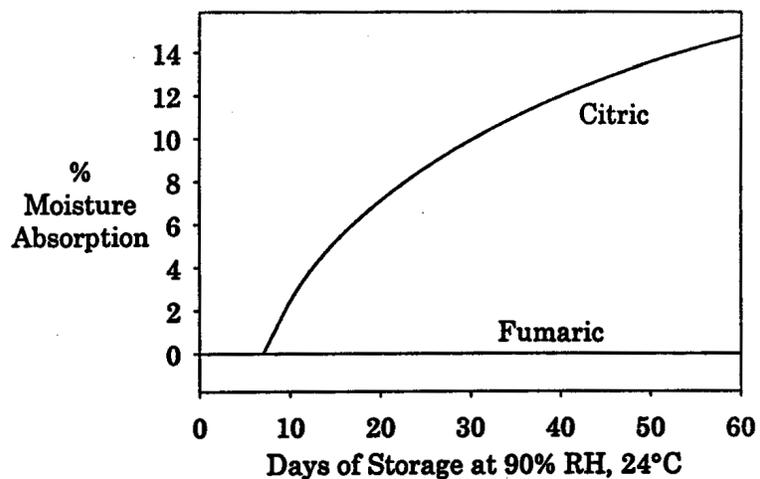
By weeks, but this depends on:

- The storage temperature of the tortilla
- The level of oxygen in the package (molds need oxygen to grow)
- The amount of initial mold spore contamination
- The level and type of preservatives used
- The moisture level of the tortilla
- The level of salt and other mold inhibitors in the tortilla

## Avoids Moisture Absorption

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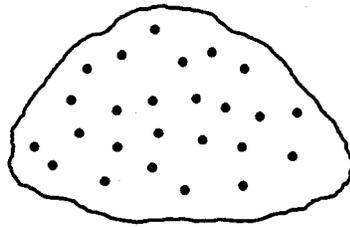
Fumaric Acid remains free-flowing and does not cake or harden during storage because it does not absorb moisture, as shown in the graph at right.



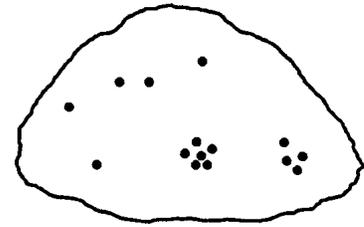
## How to Use Fumaric Acid in Wheat Flour Tortillas

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Blend with flour and other dry ingredients at the beginning of the mixing process. The mixing process must achieve complete and uniform dispersion of the Fumaric Acid throughout the tortilla dough. Incomplete dispersion of Fumaric Acid during dough mixing causes variation in pH and leavening.



*This*



Not This

### How much to use?

Enough to lower the pH of the final tortilla to the target pH (usually 5.8 – 6.2). Usage levels range from 0.1 lbs to 0.2 lbs per 100 lbs of flour, but also depend on:

- alkalinity of water
- protein content of flour
- other ingredients

Monitor the pH of the tortilla. Use more or less Fumaric Acid as needed to hit the target pH.

## References

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Danno, G. & Hosney, R.C. 1982. Effects of Dough Mixing and Rheologically Active Compounds on Relative Viscosity of Wheat Proteins. *Cereal Chemistry* **59**, 196-198.

Friend, C.P., Ross, R.G., Waniska, R.D., & Rooney, L.W. 1995. Effect of Additives in Wheat Flour Tortillas. *Cereal Foods World* **40**, 494-497.

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