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Instant Yeast

Practical technology from Lallemand Inc., parent of American Yeast Sales, producers and distributors of Eagle® yeast, fresh and instant.

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Yeast Cell Membrane

The membrane of a yeast cell is located at the inside of the cell wall and consists of a bilayer of lipids (primarily lecithin) and proteins. It normally functions as a barrier that keeps the yeast components essential for metabolism and fermentation activity inside the cell. Drying makes the cell membrane porous, so when instant yeast is rehydrated special care has to be taken to restore its barrier properties.

At warmer temperatures the lecithin in the cell membrane is fluid and contributes to its barrier properties. At lower temperatures the lecithin undergoes a liquid-to-solid phase transition, making the cell membrane a less effective barrier. Besides temperature, the trehalose and sorbitan monostearate (SPAN) in instant yeast also influence the phase transitions of cell membrane lipids and have a positive effect on the membrane's barrier properties.

Even under optimal rehydration conditions that produce the greatest gassing power, a substantial amount of glutathione leaks out and can affect dough consistency. During the critical time period before the barrier properties of the cell membrane are restored, the larger cell constituents (like enzymes and other proteins) are retained, while the smaller constituents (like glutathione and enzymatic cofactors) are lost.

After a cold shock, the gassing curve for instant yeast shows a longer lag period. Gassing power increases steadily during this lag period as many of the components that were lost during rehydration are resynthesized. The lag phase is most pronounced in rich doughs, because the yeast needs more time to fully recover from cold shock when fermentation is inhibited by high sugar levels. Loss of trehalose during rehydration also lowers instant yeast activity in rich doughs, because trehalose provides protection against osmotic shock. Together, these factors explain why proper functioning of the cell membrane is even more critical for instant yeast performance in high sugar doughs than in normal doughs.

Working with Instant Yeast

MANY BAKERS prefer instant dry yeast because of its stability, consistency, and convenience. To get the most out of instant yeast, it helps to understand how some characteristics affect its rehydration and baking performance.

CHARACTERISTICS

Production. Dry yeast starts off like fresh compressed or cake yeast before it is extruded into spaghetti-like strands. The strands are broken up into small particles, dried, and packaged. Depending on the type of dry yeast, ascorbic acid, antioxidants, and emulsifiers are added during extrusion. Instant dry yeast (IDY) was developed in the late 1960s using a new combination of a special yeast strain, a new fluidized bed drying method, addition of SPAN as an emulsifier, and a special protective vacuum packaging. IDY has become the preferred replacement for fresh yeast because of its high activity and long shelf life and because it does not require prior rehydration.

Activity. Instant yeast contains about 3.3 times the solids level of fresh yeast (96 percent compared with 30 percent) but generally has less than 3.3 times the baking activity. One reason for the lower activity is the strain being used, because it also has to have good stability and the ability to withstand drying. A second reason is the fermentation process, which is adjusted to produce higher levels of carbohydrate reserves instead of protein and leavening enzymes. A third reason is the inevitable loss of some activity under even optimal drying conditions. And finally, there is the slow activity loss that occurs during storage.

Stability. Instant yeast activity may decline 10 to 15 percent over the first one to two years after production, then more slowly after that. It is normally sold with a guaranteed shelf life of one to two years, but remains usable for much longer if it is kept unopened and away from high temperatures. Once the package has been opened, however, it is best to use it the same or the next day. Otherwise it should be stored in a moistureproof bag in the refrigerator and used within a week. If the opened package is stored in a closed container in the freezer, it will remain stable for at least three months.

Use Rate. As a rule of thumb, a 3-to-1 conversion ratio is used for replacing fresh yeast by instant yeast, but the optimum ratio for any specific application can vary

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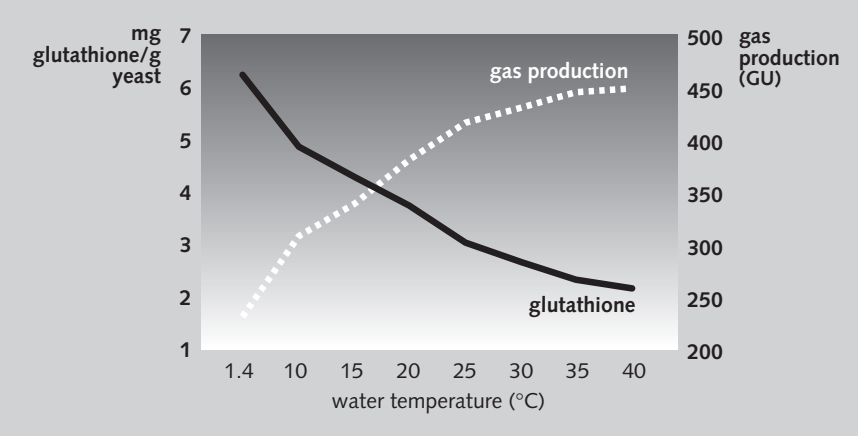
EFFECT OF WATER TEMPERATURE ON GLUTATHIONE AND GAS PRODUCTION



Working with Instant Yeast *(Continued)*

greatly. The conversion ratio obviously depends on the type and condition of the fresh yeast being replaced. It also depends on the recipe, especially the sugar and calcium propionate levels. And it depends on the addition or rehydration method being used for the instant yeast.

REHYDRATION

The recommended methods for rehydrating instant yeast are aimed at avoiding direct contact with excessive amounts of cold water. Using either warm water or a slow rehydration helps to optimize baking performance.

Blend with flour. The simplest method for using instant yeast is by blending the instant yeast thoroughly with the flour before adding (cold) water. The flour absorbs much of the water so that it doesn't come into direct contact with the yeast. Using this technique, the mixer can be started immediately after adding the water, and the dough can be checked at the end of mixing for undissolved yeast particles by stretching it into a thin film. When using ice-cold water, it is best to leave the yeast in the flour for about thirty minutes before adding the cold water and starting the mixer. This improves activity by giving the yeast time to absorb some of the moisture from the flour, as long as the temperature of the flour itself is not extremely cold.

Sprinkle on dough. Another method is to mix all the ingredients except the yeast for one to two minutes, then sprinkle the instant yeast on top of the partially mixed dough and continue mixing. Because the instant yeast is added at a time when most of the (cold) water has been absorbed by the flour, a cold shock is prevented. In this method the exact timing for sprinkling the instant yeast is critical, and it is important to check if all the yeast particles have disappeared at the end of mixing. When using ice-cold water, it is best to wait three to five minutes after the yeast addition before restarting the mixer. This improves activity by giving the yeast time to slowly absorb moisture from the partially mixed dough.

Add to warm water. The traditional method for using conventional active dry yeast (ADY) can also be used with instant yeast. Blend one part instant yeast with three to four parts lukewarm (95–105˚F/35–40˚C) water. Wait ten minutes, then stir and add the fully rehydrated instant yeast to the mixer. This method is useful with high-speed mixers where the very short mix time of five minutes or less does not allow for complete rehydration. It is also useful in frozen dough applications to avoid direct contact with ice-cold water. Although the traditional method requires more time and attention, it gives the highest level of yeast activity.

Add to preferment. The traditional method can also be used with added flour. Blend one part instant yeast and one part flour with four to five parts warm (100–110°F/38–43°C) water. Wait ten minutes, then stir and add a suspension of the flour and fully rehydrated instant yeast to the mixer. This method can easily be scaled up and modified into a water brew system for automated yeast dosing in large industrial bakeries.

OTHER CONSIDERATIONS

Absorption. When replacing fresh yeast with instant yeast, absorption should be adjusted to compensate for the amount of water that is normally associated with fresh yeast. Add 2 percent extra water for every 1 percent of instant dry yeast used.

Ingredients. Calcium propionate and high sugar levels reduce yeast activity. Increase the yeast level when calcium propionate is added or when high sugar levels (above 10 percent) are used.

Oxidation. Even under optimum conditions, some glutathione and other cell constituents are released from instant yeast during rehydration. Because glutathione is a reducing agent, it tends to reduce mix time and increase dough extensibility. This is desirable in some products like pizza crusts, but increases the oxidation requirement in others, like breadmaking. Most instant yeast products used for breadmaking in North America contain 0.1 to 0.25 percent ascorbic acid to provide the needed oxidation and allow bakers to switch from fresh yeast to instant yeast without additional changes. Especially in rich dough formulations with high yeast levels, it is important to either correct the oxidation level or use an instant yeast that already contains ascorbic acid.

First ISO 9002 Instant Yeast in North America

IN JANUARY OF 1997 Lallemand started production at its new instant dry yeast plant in Montréal, Canada. This state-of-the-art plant uses the latest technology and know-how from around the world. The Montréal plant has become the first yeast manufacturing facility in North America to receive ISO 9002 certification, as provided by AIBRS, an affiliate of the American Institute of Baking.

Lallemand produces and markets instant yeast under the **fermipan**® and **InstaFerm**® brand names:

- **fermipan**® instant dry yeast, available in 10 and 15 kg and 450 g packages.
- **InstaFerm**® instant dry yeast, available in 450 g packages.
- **fermipan**® instant dry yeast, available for home baking in sachets and tins for both bread machines and all-purpose baking.

An experienced Technical Team is available for your support from plant to retail bakeries. For more information, contact:

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