FREEZE-THAW: A Chilling Experience

The effects of temperature changes on frozen foods can be sublime and insidious. One should never underestimate the ravaging effects that even small temperature changes can have on the quality of food.

Formulating products which can successfully withstand the effects of temperature changes and freeze-thaw cycles is a hardier challenge than many people realize. Attacking such challenges should be done with a strong technology component, with as much outside input as possible.

This is what AFS has been doing for 30 years!

Freeze-Thaw

It is very easy for a food scientist to look at "freeze-thaw" as a single event, and one that is easily handled. For example, it is common to add starches and/or hydrocolloids to a formula, given their well-known properties in controlling syneresis.

However, calling such issues as "freeze-thaw" can be highly misleading in that the word "thaw" could imply that the product has truly become unfrozen – this rarely occurs except in the consumer's hands. On the other hand, it is also a rare event that products are frozen completely (i.e., to their eutectic point). Thus, there is free and available unfrozen water essentially constantly, and the amount present at a given moment is usually dynamic.

Measurement of the Effects

Product Development teams often try to take a quantitative approach to these issues. To the extent that this is desired or needed, there are an array of analytical methods which have been used with varying degrees of success. In most cases the objective is to increase the degree of predictability of the shelf-life of a food.

These approaches include use of simple physical measurements (e.g., determination of the extent of syneresis via centrifugation, or shear rate and shear stress measurements to dimension viscosity changes), and pH and other formula-indicating tests. Differential scanning calorimetry is also used in that enthalpy changes can indicate structural changes. Some experts believe that identifying and understanding a product's glass transition temperature can prove fruitful. Theoretically it is thought that formulating above the glass transition temperature should greatly increase shelf life.

Product Systems Which Work

AFS can custom-design product systems to handle your product's freeze-thaw challenges. Our **Actobind®** products stabilize internal moisture, while our **Actoglaze®** products stabilize surface moisture. In addition, our **Actoloid®** systems stabilize most emulsions. These minimize purge and shrinkage, maximize yields and improve flavor & texture, ensuring your products get to the end customer the way you intended.

Please contact us if your business is frozen foods!

For additional information on our products, please contact Technical Service at (800) 787-3067 or lab@afsnj.com.

***Advanced Food Systems, Inc.**: developers and manufacturers of custom ingredient systems for the perfect balance of flavor and texture!*

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