Quantifying Sucrose Crystal Content in Fondant

Nuclear magnetic resonance is fast and simple, requiring minimal operator experience or technical knowledge to run.

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Crystallization of sucrose is an important process to control in the confectionery industry. In traditional candies sucrose provides sweetness, but the amount of sucrose crystallization that occurs can be the difference between an acceptable candy and an unacceptable candy. In confections such as hard candy, caramels, gummies and jellies, sucrose crystallization is an undesirable attribute and can often lead to product waste. On the other hand, confections such as fondants and fudge rely on a certain amount of sucrose crystallization to occur to provide structural shape and mouthfeel.

The amount of crystalline sucrose determines the quality of a confection depending on whether crystallization is desired or undesired. Manufacturers can control the level of crystallization by adding crystallization inhibitors such as corn syrup, and by controlling moisture contents and processing parameters (such as agitation). In simple systems, the amount of crystallization that will occur in the finished product can be predicted using phase or state diagrams based on temperature and solubility. Although previous attempts have been made using image analysis, filtration and centrifugation, up to this point there has not been a method to quantify sucrose crystal content quickly and easily postproduction.

FONDANT

Fondant is an example of a basic confection where crystallization determines the quality of the final product. Fondants are semi-solid solutions of sucrose, corn syrup and water. They can range from the thin crème fillings of cherry cordials, which contain low levels of crystalline sucrose, to the shaped centers of peppermint patties, which contain high levels of crystalline sucrose.

Fondant is made by cooking the syrup mixture to the proper temperature to give the desired water content, often 244°F to target about 10 percent moisture. This syrup is highly supersaturated and must be carefully cooled to crystallization temperature to prevent preliminary nucleation. At a temperature of about 120°F, the crystallization rate is at its maximum, balancing the competing effects of supersaturation and molecular mobility. With intense agitation, numerous small crystals are formed to create a smooth and pumpable fondant at this temperature. When cooled to room temperature, a properly crystallized fondant sets into a firm yet pliable mass, suitable for using in a ➤

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