Candy Mystical

Consumers attach a certain sense of magic and wonder to candies. This isn't surprising, considering all of the many unique varieties of candy started out as a concentrated solution of sugar in water. Sugar Confectioners need an understanding of basic confectionery structure and technique to transform these simple ingredients into confectionery delights.

Essential Ingredients

The primary ingredient in candy is sugar as sucrose. Turning the sugar into candy involves dissolving it in water, concentrating this solution through cooking, and subsequently allowing the mass either to form mutable solid or to recrystallize. Key elements in the candy making process are in sugar's physical properties. Specifically its solubility with its effect on the water's boiling point. At room temperature, about 2 kilos of sugar will dissolve in 1 kilo of water. At higher temperatures, more sugar can be dissolved in the same amount of water. Once dissolved, however, the sugar will raise the boiling point of the water. The result of these physical chemistry properties is a specific relationship between the solution's boiling point and the amount of sugar solids contained therein.

The first part of basic candy making, therefore, is cooking a sugar solution to a specific temperature to form a supersaturated solution with known solids content. When this solution cools, the sugar's solubility decreases and the sugar crystallizes out of solution. The next part of making a candy is controlling how this

recrystallization takes place. It is also known as graining. Varying how the supersaturated syrup is physically treated while it cools controls recrystallization. Suspending a length of string into the solution and letting it slowly cool undisturbed will allow the sugar to recrystallize into large crystals on the string to form rock candy. Cooling that same solution quickly with agitation will cause fine crystals to form and be suspended in saturated sugar syrup to become fondant. Fondant is used in confectionery crème centers.
Other variables can be introduced to control the size of the condense crystals and resulting to the mouth feel of the candies. Variables might include seeding the solution with undissolved sugar crystals, changing the temperature at which agitation is begun, and adding invert sugar. The size of the added crystals during seeding serves as a pattern for the crystal size in subsequent graining and allows the confectioners to control the finished particle size. Undissolved sugar will also seed the solution, leading to undesirable crystal formation. Allowing condensing steam to dissolve residual sugar can prevent this. Temperature varying of the syrup when agitation begins allows a great deal of control over grain size. To obtain larger crystals, agitation should begin at higher temperatures. Smaller crystals are obtained by agitating at lower temperatures. The two extremes of this range of temperatures are usually avoided to prevent the finished candy being too gritty or lacking body.
Sucrose is a disaccharide consisting of one molecule each of glucose and fructose. Breaking this bond will yield a mixture of glucose and

fructose monosaccharide known as invert sugar. When invert sugar is present in a batch of candy, it tends to reduce the grain size. At higher levels, the invert sugar can even prevent crystal formation to yield a mutable sugar glass such as hard candies. Adding invert sugar allows confectioners to include the exact amount needed to control crystallization. The desired amount of invert sugar can be obtained by using invert-containing ingredients such as glucose syrup. Glucose syrup is partially hydrolyzed tapioca starch. The degree to which the starch is converted into syrup containing these reducing sugars is that syrup's dextrose equivalent (DE). The higher the DE, the sweeter the syrup is. The lower you go, the more viscous it is. Higher DE glucose syrup also tends to pick up moisture more quickly and increase browning, and they are better at preventing crystallization. 42 DE Glucose syrup is used in high-boil candies like caramels and hard boil. DE is not representative of the carbohydrate profile; same DE but changing the carbohydrate profile will change performance. The high maltose has lesser tendency to browning when cooked at higher temperatures than higher dextrose. It also gives the finished hard candies a drier surface

Classification

Candies can be group into four basic types.

1. Ungrained candies are candies in which the sugar isn't crystallized. These include hard candies, as well as chewy candies such as toffee and caramel. Hard candies start with a basic sugar/ glucose syrup blend cooked down to around 2% moisture and blended with flavors and colors. Varying the ratio of

sweeteners produces different textures and different stability. Cooking the basic sugar/ glucose syrup blend to a moisture level between 3 to 15% forms the basis of a chewy non-grained candy. Cooking to these higher moisture levels will not favor the production of invert sugar, as is the case with hard candies. As a result, the addition of glucose syrup is critical to prevent undesired graining in chewy candies. The key is basic sugar/ glucose syrup ratio. The more sugar crystals, the tougher and grainier the candy is. The more glucose syrup it will be chewier. Caramels, on the other hand, require milk and fat in the formula to provide flavor and color. In caramels, the Maillard reaction that goes on with the reducing sugars and milk proteins is important for developing both flavor and color. The higher the amount of reducing sugar (higher DE) Maillard reaction will speed up.

2. Grained candies include products such as after-dinner mints, fondants/crème centers, and fudge. Grained candy formulas are similar to those of chewy candies. To promote crystallization, however, the formula must have a higher level of sugar solids and the process usually includes agitation.

3. Jelly candies, such as gumdrops, include starch, pectin or gelatin in the basic formula to achieve yet another unique candies texture. Texture through the selection of the stabilizer system. The type of gelling agent use will

make the biggest difference. A gum-based jelly candy will be chewier, while a starch jelly candy will be shorter. It is also will be stickier. Pectin jellies make a high quality jelly candy with a good texture and good flavor release (unique texture which consists of a relatively soft bite with a short texture and rapid melt away). Pectin is used more in higher priced, premium jelly candies and centers. A gelatin-based jelly candy gives a greater clarity. The gelatin normally used has a medium to high bloom or gel strength. A wide range of textures can be generated using either lower concentrations of a high-bloom gelatin, which gives a more tender and short texture jelly candy or higher concentrations of a low-bloom which gives a more elastic and chewy texture jelly candy.

4. Aerated candies comprise a large group of products. Aerated candies can be based on a syrup mixture that is either ungrained or grained. These candies are unified by the fact that they all require the inclusion of air into the basic syrup matrix during processing. Aeration itself provides a shorter texture, modifies mouth feel and reduces stickiness of the candy. Aeration is normally in two means: chemical or mechanical. In chemical aeration, the candy will contain ingredients such as sodium bicarbonate to leaven it like a baked product. In mechanical aeration, the formula will contain a foaming agent and/or a stabilizer, and it will have air incorporated using a continuous pressure beater. Aerated

candies may be either grained or ungrained, their sweetener blends can be quite different from one another. Marshmallow provides a good example because it is made in both forms. A traditional marshmallow might contain about 60% glucose syrup, 30% sugar, and 1 % to 2% gelatin. The glucose syrup/sugar ratio here will provide only about 35% to 40% solids in order to prevent crystallization. Crystallization can be further avoided with selection of higher conversion glucose syrup, which contributes more invert sugar to the formula. A grained marshmallow, you simply increase the sugar ratio to the point where it will crystallize about 60% to 65%. Whipping it and seed it with a little powdered sugar. As it cools, the sugar crystallizes out to form the grained marshmallow. Aerating agents, which often are protein-based ingredients such as egg albumen and soy protein are used. Stabilizers are often used in aerated candies. Gelatin is a key stabilizer because gelatin in this application decreases surface tension and it gives the cell walls resistance to deformation and maintains the structure. Water-binding capabilities also help to increase shelf life.