

## A

### **Acidity**

Acidity can either refer to how sour something tastes, or can refer to the pH scale. pH is a measure of how many hydrogen atoms will disassociate (break off) from a molecule and form H<sup>+</sup> ions. The more H<sup>+</sup> ions, the more acidic the solution. Or to be more precise, pH is the negative logarithm of the hydrogen ion concentration:  $\text{pH} = -\log[\text{H}^+]$ . Solutions that have a pH lower than 7 are considered to be acidic. Something that is high in acid, has a low pH.

### **Aerobic Plate Count (APC) or Standard Plate Count (SPC)**

Aerobic plate count is a microbiological method used to measure the amount of microorganism in a product. This method only measures microorganisms that grow in the presence of air. APC testing can be used to assess the safety of finished products. If measuring a culture product, like yogurt, it can measure the quantity of probiotics (beneficial bacteria) present.

### **Air Cell**

When a frozen dessert mix is frozen in an ice cream freezer, a paddle, called the dasher, whips air into the product. The air exits as tiny bubbles, or air cells. As the product is whipped, air cells become smaller and smaller, yielding a fine dispersion of air cells in the finished product.

### **Allergen**

An allergen is anything that causes the immune system to mount a response to a threat that is actually harmless to the body. In the United States, 8 major food allergens must be declared on food labels. These include: eggs, fish, milk, peanuts, shellfish, soy, tree nuts, and wheat.

### **Anhydrous Milk Fat (AMF)**

AMF is essentially pure milkfat made from fresh cream or butter. Water, protein, lactose, and free fatty acids are removed to create a product that is 99.8% milkfat. AMF has several benefits for its fresh counterparts because it has a much longer shelf life than cream or butter, it contains minimal water, so is easier to transport, and with minor formula adjustments, can be used at the primary milkfat source in ice cream and frozen dessert formulations. Ghee or clarified butter are very similar culinary ingredients.

## B

### **Branding**

The expression of the essential truth or value of an organization, product, or service. It is the communication of characteristics, values, and attributes that clarify what this particular brand is and is not. A brand will help encourage someone to buy a product, and it directly supports whatever sales or marketing activities are in play, but the brand does not explicitly say, "buy me, support me." Instead, it says, "This is what I am. This is why I exist. If you agree, if you like me, you can buy me, support me, and recommend me to your friends."

### **Batch Freezer**

A batch freezer is a style of ice cream freezer that can make smaller quantities of ice cream or frozen dessert at one time. Batch quantities may be as small as a quart up to several gallons. These machines are commonly used by small businesses, especially gelato shops where product is made and served fresh out of the batch freezer. They are very simple to use, have their own refrigeration unit in the machine, freeze out product very rapidly, and have relatively small footprint (especially in comparison to a continuous freezer).

### **Batch Pasteurization (Low Temperature Long Time Pasteurization- LTLT)**

See also *Pasteurization*. This is gentle heating method that protects the flavor and physiochemical properties of the product, while still eliminating pathogenic microorganisms and reducing spoilage microorganism load. For ice cream and frozen dairy dessert mixes, the product must be heated to 155°F (68°C) for 30 minutes.

### **Bulky Flavoring**

Bulky flavorings are defined in [21CFR135.110](#) as cocoa, chocolate, nuts, fruit, dried fruit, and fruit juice. When added to ice cream, the solids from these ingredients may be multiplied by a set reduction factor in order to accommodate the requirements of the standard of identity as well as the usage level of the bulky flavoring.

### **Butter**

Butter has a legal standard of identity in the United states, found here: [21CFR101.67](#). Butter is usually made from cream and must contain at least 80% milkfat.

### **Buttermilk**

Buttermilk is a byproduct of the butter making process. As cream is churned and the fat coalesces, the liquid portion of the cream is excluded from the fat network that is formed. This ingredient is full of functional ingredients, such as phospholipids and many other components from the native milk fat globule membrane. Because of these functional molecules as well as other nonfat milkfat solids, buttermilk is a great ingredient for ice cream and frozen dairy desserts. This kind of buttermilk is not the cultured buttermilk you find in the grocery store. That is a wholly different product that is not commonly used in frozen dessert mixes.

### **Butter oil**

Butter oil is a concentrated milkfat ingredient very similar to anhydrous milkfat. It must contain at least 99.3% milkfat.

## **C**

### **Cacao**

Theobroma cacao or cacao tree produces the much loved cocoa pod from which chocolate, cocoa butter, and cocoa powder are made. For a summary of cocoa and chocolate processing, follow this link: <https://youtu.be/-5U6xMoL0Ls>. For a history lesson, click here: <https://youtu.be/ibjUpk9lagk>.

Chocolate and cocoa have standards of identity in the United states, found here: [21CFR136](#). If a product that contains chocolate or cocoa falls outside of the standard of identity, it cannot be called by those names. You may see terms such as compound coating, chocolaty coating, fudge, chocolate flavored, etc that signal the product is not legal chocolate.

### **Clean in Place (CIP)**

This is method of cleaning where a piece of equipment can be sanitized without taking it apart. Many pieces of equipment have a very intentional sanitary design that insures all parts of the interior are completely cleaned and can handle elevated time and temperatures and chemical detergents.

### **Clean Out of Place (COP)**

This method of cleaning requires equipment to be taken apart and cleaned in a designated area, often called a COP tank.

### **Coliform Bacteria**

Coliform bacteria are microorganism that are found naturally in the environment and especially in fecal material. While most coliform bacteria do not cause illness they are an indicator of contamination. Checking for coliform bacteria is a standard practice in manufacturing to insure the safety of the environment and the finished food products.

### **Continuous Ice Cream Freezer**

Continuous ice cream freezers are often use for large scale manufacture of frozen desserts. Frozen dessert mix is continually pumped to the back of the freezer barrel, moved forward by an auger, concomitantly being whipped and frozen until it reaches the front of the barrel as the finished frozen dessert and pumped to the filler line. These types of freezers can process hundreds of gallons of frozen desserts an hour.

### **Critical Control Point (CCP)**

A critical control point, or CCP, is a step in a processing procedure that is identified was being essential to prevent, eliminate, or reduce a hazard (physical, chemical or microbiological). For example, in ice cream making, pasteurization of ice cream mix is a critical control point, because this step insures that pathogenic bacteria have been destroyed. Determining CCP's is an important part of creating an effective HACCP/HARPC plan.

### **Certified Humane Cage-Free**

This standard ensures that laying hens have wholesome, nutritious food, access to clean water, and adequate space to engage in normal behaviors, among other criteria crafted by veterinary professionals. For more information follow this link: <https://certifiedhumane.org/makes-certified-humane-cage-free-eggs-different-cage-free-eggs/>.

### **Coagulation**

In food systems, coagulation usually refers to the denaturation and binding of proteins that leads to clumping. This process is exploited in cheese making, when enzymes are added to cause casein proteins to clump together and separate from the whey. This can also happen unintentionally when a substance is exposed to extremes in temperature, pressure, acidity, or ionic strength.

### **Co-branding**

Co-branding involves partnering with successful branded companion products for increase product awareness. There has been an increase in the number of new ice cream products that use ingredients from well-known candy, cookie, fruit, and flavoring manufactures. In particular, novelty manufacturers have placed a strong emphasis on co-branding with popular candy flavors. And, some ice cream manufacturers have teamed up in recent years with popular coffee and chocolate brands to create "ultra-premium" products. Market signs indicate that this trend will continue to be important in the future.

## **D**

### **Destabilization of Fat- see partial coalescence**

### **Dextrose Equivalents**

Dextrose equivalents (DE) is a measure of how many reducing sugars are present in a glucose syrup ingredient (corn syrup, tapioca syrup, etc). Glucose syrups are produced by treating food starch, like corn starch, with enzymes that breakdown long chain starch molecules into shorter starch chains, maltose, and glucose. The more breakdown that occurs, the higher the DE of the resulting syrup. Corn syrup is a common ingredient in ice cream formulations because it increases mix viscosity, yields a pleasant chew to the ice cream, and improves melt resistance, among other benefits.

## **Draw Temperature**

Draw temperature is the temperature at which a frozen dessert is extruded from an ice cream freezer. The lower the draw temperature, the longer the churn time and more ice has formed in the product. Optimal draw temperature is dependent on what the packaging configuration is, what the filling equipment can handle, and what yields the best product quality. For example, if a standard ice cream is being filled into pints (product needs to be able to fill from the bottom to the top of the container without voids), the draw temperature will be warmer than if that same ice cream is being made into a sandwich (ice cream needs to be able to hold its shape while being sandwiched between wafers and then wrapped individually).

## **Defects and Descriptors**

Understanding sensory attributes and descriptors can be extremely helpful in developing new products, sourcing alternative ingredients, judging competitor products, and enjoying frozen desserts.

Good resources to understand common attributes and defects can be found here:

[Chapter 10: Ice cream and related products](#)

<https://www.uoguelph.ca/foodscience/book/export/html/1752>

## **E**

### **Emulsion**

An emulsion is a mixture of two or more components that are typically immiscible (don't mix together) but are brought together by an emulsifier (see definition below) and some elbow grease- vigorous mixing or homogenization. Emulsions are characterized by a continuous phase and a discontinuous or dispersed phase. There are two main types of emulsions, oil in water and water in oil emulsions.

Oil in water emulsion: The oil is the dispersed phase and the water is the continuous phase. Examples include, whole milk, vinaigrette salad dressings, and ice cream.

Water in oil emulsion: The water is the dispersed phase and the oil is the continuous phase. Examples include butter and margarine.

For more information, follow this link: <https://www.ift.org/news-and-publications/food-technology-magazine/issues/2013/august/columns/processing-1>

### **Emulsifier**

Emulsifiers are molecules that are amphiphilic, or have parts that like to associate with the water (aqueous-hydrophilic) phase and parts that like to associate with the oil (lipid- lipophilic or hydrophobic) phase. These unique molecules have the ability to reduce the energy or surface tension between immiscible components. Lecithin, mono and diglycerides, polysorbate 80, tweets, spans, and proteins are all able to act as emulsifiers. They can also improve whippability in ice cream during freezing, as well as produce a smoother and drier body upon extrusion.

## **F**

### **Foam**

A foam is very similar to an emulsion, in that it is a mixture of two substances, where one is the dispersed phase and one is the continuous phase. In the case of a foam, a gas is dispersed in a liquid or solid continuous phase. Ice cream is a foam, because it contains a fine dispersion of air bubbles suspended in a frozen solid matrix.

### **Freezing Point Depression**

Pure water typically begins to freeze 32°F (0°C). There are certain small molecules, that when in solution, can lower the temperature at which freezing begins. Sugars, salts, alcohols, and acids can depress the freezing point. This phenomenon is frequently exploited during the winter when roads are salted to prevent icy surfaces or in ice cream so the product is still scoopable out of the freezer.

### **FDA (Food and Drug Administration)**

FDA is an agency within the United State Department of Health and Human Services. FDA is responsible for protecting public health by assuring the safety, efficacy, and security of human and veterinary drugs, biological products, medical devices, cosmetics, products that emit radiation, and our nation's food supply.

### **Frozen Custard**

Frozen custard also has a legal standard of identity in the US, found here: [21CFR135.110](#). It follows the same standards as ice cream but with the addition of also containing at least 1.4% egg yolk solids. Traditionally, frozen custard has lower overrun (less air whipped into the product), which creates a distinctly dense, creamy texture.

### **Frozen Aerated Dessert**

A frozen aerated dessert is any product that is frozen using a batch or continuous ice cream freezer. It encompasses standard of identity ice cream, frozen dairy desserts, plant based desserts, water ices, sherbets, custards, sorbets, and all types of novelties.

### **Frozen Yogurt**

Unlike ice cream or low fat ice cream, frozen yogurt is made with cultured milk rather than fresh. The bacterial cultures in the yogurt provide a tangy flavor and thick texture. The thickness of yogurt provides a creamy texture without a high fat content. Fat and sugar contents of frozen yogurt vary widely brand to brand. Frozen yogurt became popular in the United States as a low-fat alternative to ice cream during the latter part of the 20th century.

## **G**

### **GMO (genetically modified organism)**

An organism whose genetic material has been altered using genetic engineering techniques. Organisms that have been genetically modified include micro-organisms such as bacteria and yeast, insects, plants, fish, and mammals. GMOs are also widely used in scientific research and to produce goods other than food.

### **Gelato**

[Gelato](#) is the Italian word for ice cream, but it differs in distinct ways from the legally defined ice cream found in the United States. Gelato formulas typically contain 4-8% milkfat, ~7% nonfat milk solids, and 12-16% sugar. Gelato formulas almost never contain eggs and if served fresh, stabilizers and emulsifiers are rarely used. The freezing process is also different as less air is whipped in, typically 50% overrun or less. This creates a very dense product. Because of the low overrun, gelato is a great canvas for intense flavoring. Classic flavors include hazelnut, pistachio, chocolate, vanilla, and stracciatella (sweet cream gelato with chocolate flakes). The most traditional gelatos are frozen out in batch freezers on a small scale, so that product can be extruded into shallow pans and served immediately in a semi-frozen state. This means serving temperature is much warmer than ice cream, which naturally enhances flavor intensity and sweetness.

### **Granita**

[Granita](#) originates from the island of Sicily. It is an icy frozen dessert made with sugar, water, and a flavorful liquid, such as fruit juice or puree, coffee, liquor, etc. Large ice crystals are allowed to form during the freezing

process, yielding the characteristic coarse texture. The coarse texture defines a granita, making it distinctly different from sorbet or Italian Ice.

## H

### **HACCP (Hazard Analysis Critical Control Points)**

[HACCP](#) is a program originally created in the 1960's between NASA and Pillsbury in order to create safe food products for space missions. HACCP is a preventative focused program that is designed to assess food safety risks (biological, chemical, and physical), identify critical risk areas, implement interventions to mitigate risks, and establish record keeping procedures to insure and document compliance. The goal is to focus on addressing risk areas during processing in order to prevent and reduce risk of recalls of finished product.

### **HARPC (Hazard Analysis and Risk-Based Preventive Controls)**

[HARPC](#) is the next generation of HACCP and is part of the Food Safety Modernization Act of 2011. HARPC differs from HACCP in several ways. There is a greater focus on implementing science and evidence based interventions and protocols, having trained people responsible for the plan and more frequent reviews, vetting individual suppliers and ingredients, defense against intentional adulteration, and emphasizing prevention as much as possible.

### **High intensity sweeteners (see nonnutritive sweeteners)**

### **High Temperature Short Time- HTST- Pasteurization**

HTST pasteurization is a continuous method of pasteurization that allows thousands of gallons of mix to be processed in rapid succession. Legal HTST pasteurization requires a frozen dessert mix to be heated to 175°F (79°C) for 25 seconds or to 180°F (82°C) for 15 seconds. This is accomplished by using a multi-section plate and frame heat exchanger where a series of stainless steel plates are compressed together with either a heating or cooling medium on one side. This system allows for rapid and efficient heat exchange.

### **Hydrocolloids**

[Hydrocolloids](#) are “water-soluble polymers that contribute viscosity and gelation in solution.” They are often polysaccharide molecules that have unique water binding abilities that can increase viscosity at low usage rates, stabilize emulsions, and some can slow ice recrystallization in frozen desserts. This is a class of highly functional ingredients that include guar gum, locust bean gum, cellulose gum, and carrageenan to name a few. Each has their own unique structure and function and are often used in combination to achieve a desired functionality.

### **Heat Shock**

Heat shock is what a frozen dessert experiences when there are fluctuations in storage temperature. As the temperature increases the smallest ice crystals melt, when the temperature drops, that now liquid water will then collect into existing ice crystals that didn't melt and refreeze. Overtime with many temperature fluctuations, the average size of the ice crystals grow larger and larger causing an icy defect in the frozen dessert.

### **HFCS (high fructose corn syrup)**

High fructose corn syrup is a sweetener derived from corn. It's made the same way as corn syrup, except that the initial enzyme treatment is allowed to proceed until the starch has been completely hydrolyzed into a glucose syrup. That syrup is then treated with another enzyme called glucose isomerase, which converts the glucose molecules into fructose. HFCS has a few functional differences from sucrose, such as, fructose is

sweeter than sucrose, so less is needed to achieve the same sweetness impact, it depresses freezing point more efficiently than sucrose because of its low molecular weight, and is a very cost effective ingredient.

### **Homogenization**

Homogenization is the process of uniformly distributing particles or components within a liquid when at least one of the components is not soluble in the other. For example, homogenization is used to reduce the fat droplet size of the milkfat in an ice cream mix in order to create a stable emulsion that resists creaming or separation. Homogenizers used in ice cream or frozen dessert processing are made up of two stages, or sections. Pressure is applied to the stage, which forces the liquid mix through a small opening, this causes violent cavitation, which disrupts the large fat droplets, forming a smaller, finer dispersion of droplets.

### **Hawaiian Shave Ice**

[Hawaiian Shave Ice](#), not to be confused with shaved ice, is a distinct product. It is made by finely shaving ice off an ice block, rather than crushed ice, so the “snow” is very fine in texture. It’s flavored by adding syrups or fruit juice on top. Many shave ice stands will add a scoop of ice cream under the mound of snow. Make sure to ask for a snow cap, or a drizzle of condensed skim milk to finish off your genuine Hawaiian shave ice.

### **Ice Crystals**

Water is frozen into ice crystals when a dessert mix is processed in an ice cream freezer. As the mix is cooled and frozen by the refrigerant surrounding the barrel, the dasher scrapes off the newly formed ice from the surface. This rapidly removes heat from the mix and allows of quick freezing of the dessert, which keeps ice crystals small.

### **Inclusion (also called particulates)**

This is the industry term used for particulates or chunks added to frozen desserts. This includes, cookie dough, chocolate chunks, strawberry pieces, peanut butter cups, and nuts of all kinds, to name a few. Inclusions are added to the frozen dessert after it exits the ice cream freezer using a special piece of equipment called an ingredient or fruit feeder. This device doses inclusions in at a steady rate and then blends them into frozen dessert for uniform distribution.

### **Ice Cream**

In the United States, ice cream had a legal definition, found here: [21CFR135.110](#). Ice cream is a frozen dairy dessert that contains at least 10% milkfat, 20% total milk solids (including milkfat and nonfat milk solids), and ~36% total solids (including milk solids, sweetener solids, and other safe and suitable ingredients). Ice cream is a whipped product and may have up to 50% of its volume as air (100% overrun).

There are some quality superlative gradations that exist that are not legally mandated, but are defined by tradition, such as economy, premium, and super premium.

**Economy ice creams** meet minimum standards as defined by the standard of identity. They typically contain 10% milkfat, 10% nonfat milk solids, 12-17% sweetener ingredients, gum stabilizers and emulsifiers and contain the maximum allowable overrun. Economy style ice creams are more likely to use lower cost milk solids ingredients such as whey powder and buttermilk, lower cost sweeteners such as corn syrup and high fructose corn syrup, higher usages of gum stabilizers and emulsifiers to manipulate mouthfeel, and be lower in total solids than more premium formulations.

**Premium ice creams** tend to have lower overrun (70% to under 100%) and higher fat contents (more than 10% milkfat) than regular economy ice cream, and the manufacturer uses higher quality ingredients.

**Super premium ice creams** spare no expense. They use high quality ingredients and simple mix formulas and high usage rates of any variegates and inclusions. They have high fat content, usually above 14% milkfat and very low overrun, usually below 50%.

Lower fat and calorie ice creams also exist. To the greatest extent possible, they must adhere to the standard of identity for ice cream, but are allowed to deviate in order to meet the other requirements for a nutrient content claims, such as reduced fat, low fat, or light.

**Reduced fat ice creams** contain at least 25% less total fat than the referenced product (either an average of leading brands, or the company's own brand)

**Light ice creams** contain at least 50% less total fat or 33% fewer calories than the referenced product (the average of leading regional or national brands).

**Lowfat ice creams** contain a maximum of 3 grams of total fat per serving (2/3 cup).

**Nonfat ice creams** contain less than 0.5 grams of total fat per serving (2/3 cup).

### **Italian Ice**

Italian ice is a smooth, non-dairy frozen dessert. It contains no dairy, and is made in a similar manner to ice cream. Sweetened and flavored water is agitated during the freezing process to create very fine ice crystals, which yield a soft, smooth product. The freezing method and resulting texture are what makes Italian ice different from its more rustic counterparts, granita and shaved ice.

### **IDFA (International Dairy Foods Association)**

IDFA is an organization consisting of the Milk Industry Foundation, National Cheese Institute, and International Ice Cream Association.

J

K

L

### **Lactase Enzyme**

Lactase is an enzyme that occurs naturally in the human body for the purpose of breaking down lactose into glucose and galactose.

### **Lactose**

Lactose is a disaccharide made up of one molecule of glucose and one molecule of galactose held together by a  $\beta$  1 $\rightarrow$ 4 glycosidic linkage.

### **Lactose Intolerance**

Most people produce lactase enzyme naturally and are able to digest lactose when they are infants, but lose the ability during childhood or their early adult years. Lactase persistence in adults is actually pretty uncommon and is primarily found in people of Northern European ancestry. About 75% of the world's adult population is lactose intolerant. People who are lactose intolerant cannot digest lactose, so the sugar passes through the small intestine intact. This increases the osmotic pressure in the intestines causing water to rush in and dilute the high concentration of sugar. Once it reaches the large intestines there are loads of bacterial that will ferment the lactose and produce gas. This causes bloating, cramping, gas, and diarrhea.

For people who are lactose intolerant and also want to consume milk or milk products, lactose-free alternatives exist. The milk ingredients are treated with lactase enzyme to break down the lactose, this actually increase sweetness because glucose and galactose are much sweeter individually than lactose is.

## M

### **Mellorine**

Mellorine has a legal definition in the United States, which can be found here: [21CFR135.130](#). Mellorine is an ice cream like product that uses vegetable fat as the primary fat source rather than cream (milkfat).

### **Milkfat (butterfat)**

Milkfat is exactly what it sounds like, it's the fat portion of milk. It is also commonly called butterfat. Cream, dried cream, plastic cream, butter, butteroil, anhydrous milkfat, are all sources of milkfat. All can be used as the primary milkfat source in ice cream.

### **Milk Solids Not Fat (MSNF)**

Milk solids not fat are exactly what they sound like, they are the nonfat components of milk, excluding water. MSNF are made up of lactose, whey proteins, casein proteins, minerals, vitamins, and naturally occurring acids. Sources of MSNF include: milk (whole and skim), concentrated milk, evaporated milk, sweetened condensed milk; superheated condensed milk, concentrated skim milk, evaporated skim milk, condensed skim milk, superheated condensed skim milk, sweetened condensed skim milk, sweetened condensed part-skim milk, nonfat dry milk, sweet cream buttermilk, condensed sweet cream buttermilk, dried sweet cream buttermilk, nonfat dry milk, reduced lactose nonfat dry milk, whey powder, milk protein concentrate and isolate, whey protein concentrate and isolate, ammonium caseinate, calcium caseinate, potassium caseinate, and sodium caseinate, hydrolyzed milk proteins.

### **Mono and Diglycerides (M&DG)**

Mono and diglycerides are a very commonly used emulsifier in frozen desserts. They are surface active, meaning they have the ability to decrease interfacial tension between the fat globules and the aqueous serum phase of an ice cream mix. This surface activity is very important in order to create conditions in which partial coalescence, or fat destabilization, can occur during the dynamic freezing process.

**Modified milk ingredients:** Ingredients that are derived from milk but have been altered, such as calcium reduced skim milk, whey cream, whey butter, cultured milk products, casein and milk protein concentrates.

## N

### **Nonnutritive sweeteners (High intensity sweeteners)**

Nonnutritive sweeteners are ingredients whose primary purpose is to provide sweetness, but contain few or no calories. They are also called high intensity sweeteners as they are many times sweeter than sugar, so have

very low usage rates. There are 8 FDA approved non-nutritive sweet in the US: acesulfame potassium, advantame, aspartame, monk fruit extract, neotame, saccharin, stevia, sucralose.

### **Novelties**

Novelties are typically individually wrapped or portioned frozen dessert confections. They often come on sticks, in cones, as sandwiches, as a bar, and even in cups. They may contain ice cream, but may also be any type of frozen dessert such as water ices, sorbets, popsicles, nondairy desserts, etc. The sky is the limit with novelties.

### **Nutrition Labeling and Education Act of 1990 (NLEA)**

The Nutrition Labeling and Education Act was signed into law on November 8, 1990 by President George H.W. Bush. The law gives the Food and Drug Administration (FDA) authority to require nutrition labeling for most foods regulated by the Agency; and to require that all nutrient content claims (ex: 'high fiber', 'low fat', etc.) and health claims meet FDA regulations.

## **O**

### **Overrun**

Overrun is the amount of aeration incorporated into a frozen dessert. More specifically, it is the percent volume increase. In ice cream, the amount of overrun is governed by federal standards. Finished ice cream must weigh at least 4.5lbs per gallons. This typically works out to be about 100% overrun, or the original volume of ice cream mix has increased by 100%, meaning 50% of the volume is air, and 50% of the volume is mix. If a product is 50% overrun, 25% of the volume is air, and 75% is mix.

## **P**

### **Partial Coalescence**

Partial coalescence, or fat destabilization, is a phenomenon that occurs in whipped cream and frozen desserts containing milkfat, and some types of vegetable fats. Because of the complex array of fatty acids and triglycerides, milkfat has a very wide melting range. Because of this property, even at low temperatures, within each fat droplet, there is a portion of solid and liquid fat. During the dynamic freezing process, when fat droplets collide, they stick together, but because of the solid fat portion, the majority of the original structure of each droplet is retained. This allows for grape like clusters of fat droplets to form. These partially coalesced fat globules will help stabilize air cells and create an internal scaffolding in the finished product. The degree of partial coalescence can impact melt rate as well as the perceived creaminess of the final frozen dessert. However, this phenomenon can be overexpressed, and lead to the formation of butter granules, which is considered a defect.

### **Pasteurization**

Pasteurization is a heat treatment designed to destroy pathogenic bacteria (the kind of germs that make you sick) and to reduce the number of spoilage microorganism (the kind of germs that make milk sour and curdle and make your food go funky). Heating also helps to hydrate dry ingredients, activate certain ingredients like gums and emulsifiers, and develop flavor. Cooking dairy based mixes can create nice warm custardy flavors due to the Maillard Reaction. Pasteurization also liquefies all the fat, so efficient homogenization is possible.

There are 2 primary types of pasteurization: Vat pasteurization (also called low temperature long time, LTLT) and high temperature short time pasteurization (HTST). Vat pasteurization requires frozen dessert mixes to be

heated to 155°F (68°C) for 30 minutes. HTST pasteurization requires mix to be heated to 175°F (79°C) for 25 seconds or to 180°F (82°C) for 15 seconds.

## Q

### **Quality Assurance and Quality Control**

[Quality assurance and quality control](#) (QA/QC) are a part of a quality management program. QA are the defined qualities and implemented procedures to insure product is meeting expectations. QC is the actual inspection of product based on those defined criteria and procedures.

## R

### **Recall**

A [food recall](#) is when a manufacturer removes a product from the market because they have reason to believe that it may contain a physical, biological, or chemical hazard. FDA and USDA can require a product to be recalled if the manufacturer will not voluntarily initiate the removal.

### **rBST (recombinant bovine somatotropin) and rBGH (recombinant bovine growth hormone)**

These are synthetic hormones that are given by injection to dairy cattle to increase milk production. It has been used in the United States since it was approved by the Food and Drug Administration (FDA) in 1993. Since 2000, its use has not been permitted in the European Union, Canada, Australia, New Zealand, Japan, and Israel.

## S

### **Serving size**

Also called a “reference amount customarily consumed per eating occasion” or RACC. The legal definition can be found in [21CFR101.12](#). This quantity is designed to be representative of the amount actually consumed for a given product or product category. For example, in 2020 the RACC for ice cream and frozen desserts (including novelties) was increased from 1/2 cup to 2/3 cup, which was found to be more representative of the actual amount consumer eat as one serving.

### **Soft-Serve**

Soft-serve can either refer to the consistency of a frozen dessert or a style of dispensing a frozen dessert. When referring to the consistency, all “hard pack” ice cream/ frozen dessert that is available in pints and cartons at the grocery store was in a soft-serve consistency when it was packaged. In order for product to be efficiently filled into cups, pints, and pails, the frozen dessert needs to be in a semi frozen state, so that it can fill the container from the bottom up, without leaving empty pockets. A softer consistency aids in this. For distribution purposes, that product is then frozen or hardened further to increase its stability. When referring to the style, a soft serve ice cream freezer is designed to freeze product on demand, which allows for that lovely soft consistency that is perfect served fresh on a cone or in a dish.

### **Smoothie**

A smoothie is a blended semi frozen drink that is often fruit based but may also contain vegetables. Ice cream, ice, protein powder, nut butters, healthful oils, and vitamins as common additions. Often designed or marketed to be healthy.

## **Standard Plate Count (SPC)- see aerobic plate count**

### **Standard of Identity**

[Standards of identity](#) in the United States came into existence after the passage of the 1938 Food, Drug, and Cosmetic Act. It gave the FDA the power to create legal mandatory requirements for commercially available food products. SOI's are designed as consumer protection measures, to guarantee that products sold in the US adhere to those requirements and use safe and suitable ingredients.

### **Sweeteners (nutritive)**

Nutritive sweeteners are ingredients that provide both sweetness impact and contribute caloric value and total solids. They are also important ingredients used to depress the freezing point of frozen desserts. Common nutritive sweeteners include, cane or beet sugar, corn syrup, high fructose corn syrup, honey, maple syrup, fruit juices concentrates, etc.

### **Sugar Alcohols**

Sugar alcohols are derived from sugars and can be found in natural sources or produced by hydrogenating mono and disaccharides. Sugar alcohols are typically lower in sweetness than sucrose but also lower in calories and have lower glycemic responses. Which makes them ideal for people with diabetes or are following a low carbohydrate diet. Sugar alcohols also contribute to freezing point depression.

### **Stabilizers**

Stabilizers are ingredients, usually derived from plants, that are used in frozen desserts as an insurance policy to protect ice crystals from growing too big, causing an icy defect. Examples of common stabilizers used in commercial ice creams are: guar gum, locust bean gum, and carrageenan.

### **Sherbet**

Sherbet also has a legal definition in the US, found here: [21CFR135.140](#). Sherbet is a very low-fat frozen dairy product. Unlike ice cream, sherbet contains a mere 1-2% butterfat and 2-5% total milk solids. Sherbet is often found in fruit flavors, most notably orange, raspberry, and lime. In many European countries, sherbet and sorbet are synonymous, both terms being used for a non-dairy type of frozen dessert.

### **Slush, Slushie, or Slushy**

"Slush" is the common term given to frozen carbonated beverages. These beverages are frozen while being constantly churned in a machine that doubles as a dispenser. Slushies are also known as Slurpees, frozen Cokes, or ICEEs and are a popular item sold in convenience stores.

### **Sno Cone**

Sno Cones are a popular summertime treat in the Southern United States. They consist of a ball made from finely shaved ice topped with bright colored flavored syrups.

### **Sorbet**

Sorbets are a frozen, non-dairy dessert made with sugar, water, and a fruit puree or other flavoring. Sorbets have a fine, soft texture due to constant churning during the freezing process. Sorbets are sometimes also flavored with wine or liqueur in addition to fruit.

### **Titrateable Acidity**

Titrateable acidity (TA) is defined as the total concentration of protons or H<sup>+</sup> ions able to be dissociated when reacted with a strong base, such as NaOH.

### **Total Solids**

Solids are the non-water contributions from a given ingredient. Total solids are the sum total of those non-water contributions. The opposite of total solids is total moisture or total water content.

U

V

### **Variegate**

A variegate is a flavored sauce added to a frozen dessert that is not fully incorporated and gives a rippled appearance. Variegates are also called sauces, condiments, ripples, revels, swirls, etc.

### **Viscosity**

Viscosity is defined as a substance's resistance to flow. Things that are high in viscosity (peanut butter, pudding) have a very thick consistency. Things that are low in viscosity (water, apple juice, maple syrup) have a thin consistency. Viscosity is typically measured in centipoise (cP).

W

### **Water Ice**

Water ice has a legal definition in the US found here: [21CFR135.160](#). Water ices must contain a minimum amount of fruit juices (At least 2% citrus fruit or juice, 6% berry fruit or juice, At least 10% other fruit or fruit juices), can contain no dairy, and the final product must weigh at least 6lbs/gal.

X

Y

### **Yogurt**

Yogurt has a legal definition in the US found here: [21CFR131.200](#). Yogurt must use a culture with *Lactobacillus bulgaricus* and *Streptococcus thermophiles* and contain at least 3.25% milkfat, at least 8.25% nonfat milk solids, and have a titrateable acidity of no less than 0.9 percent, expressed as lactic acid. This definition is often followed for frozen yogurts.