

A Review of Sugar-Based Confectionery: Properties and Types of Products

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Abstract

A sweet goods or confectionery is a group of products, rich in carbohydrates with characteristic physical and chemical properties. Due to continuous improvement and innovation in product confectionery products are accepted by all age groups across the globe. Confectionery product shows different physical state like liquid, glassy, amorphous, crystalline, and partial crystalline. During formulation and manufacturing confectionery products need to consider different properties of confectionery ingredients and the behaviour of the final product. Solubility, Glass Transition Temperature, Boiling Point Elevation and Moisture Content are the most important properties of sweet goods. Confectionery products are categorised based on product types. The Most Commonly product consider confectionery products are Hard-Boiled Candy, Cotton Candy, Fondant and Cream, Marshmallows, Nougat, Caramel and Fudge, Gum, Jelly and Gummy Candies, Compressed Tablets and Wafers, Sugar Panned Candies. This review article tries to summarize the introduction of confectionery, the basic properties of confectionery, different types of confectionery products and different quality parameters of confectionery products.

Keywords: Confectionery, Moisture, Water Activity, Relative Humidity

Introduction

In recent times confectionery products have not been limited to kid segments. Due to the technological revolution candies come up with the most interesting and new product formats where all age-group people are attracted towards sweets [Manjula K, Suneetha C., 2014]. Sugar is the basic raw material for confectionery since ancient times, with the industrial revolution refined sugar available at an affordable price [Kitt J., 2008]. Nowadays candies are not limited to enjoyment, it will add nutritional value and health benefits as well. The Addition of medicaments gives relieves pharyngeal symptoms caused by local infection [Kini R, Rathananand M, Kamath D., 2011]. Confectionery candies become more popular because of their high acceptability, minimum volume and longer shelf life of production and consider as ready to eat snack products. Sweetness is desired characteristic of confectionery products. Formulating confectionery products used sweeteners available in different forms like dissolved in water, dispersed as a crystalline phase, immobilized in the amorphous or glassy state or a combination of either state. Phase transition of sweeteners is one of the properties of manufacturing confectionery products. According to Roos and LeBail, first-order, second-order or high-order transitions are categories of phase transition in confectionery

products. It may hurt the shelf life of certain products [Roos YH. 1995, LeBail A, Boillereaux L, Davenel A, Hayert M, Lucas T, Monteau JY. 2003].

In confectionery appearance and textural properties depend on crystals. Hard-boiled candy has a glassy state, so colour and flavour are uniformly dispersed in the product. Rock candy has a crystalline structure, so the flavour and colour get concentrated on the product's surface. Confectionery products are available in a thermodynamically stable crystalline or amorphous state.

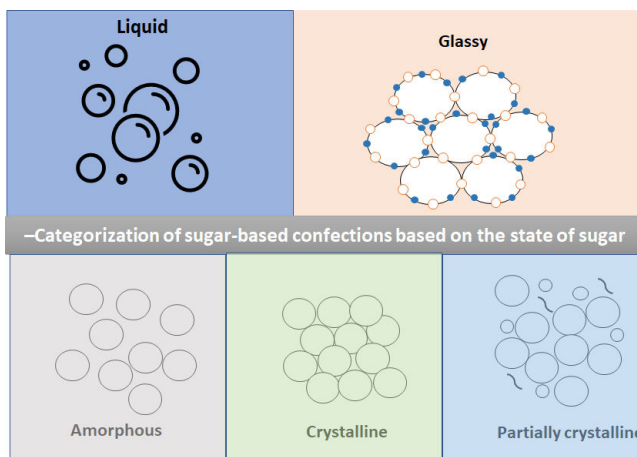


Figure No. 01 Different structure of confectionery Ingredients

Examples	Syrup candies Gummies and jellies	Ungrained caramel, Chewy nougat, Marshmallow	Cotton candy, Hard boiled candy, Brittles	Rock candy, Candy powder, Tablets or lozenges	Grained mints, Fondants and creams, Grained caramel and fudge
Product Category	Non-crystalline Liquid	Amorphous	Glassy	Crystalline	Partially Crystalline
Texture	Viscous liquid Chewy; solid-like structure due to hydrocolloids	Chewy	Syrup candies Gummies and jellies	Hard crystals, Free-flowing powder, Compacted or fused powder	Variable texture depending on crystal content

Figure No. 02 States of Confectionery Ingredients and its texture and examples [Ergun R, Hartel RW. 2009]

Properties of confectionery Product

Ingredient	Solubility (%) Temperature 20 °C	Solubility (%) Temperature 50 °C	T _g	a _w
Sucrose	66.5	72.1	65	0.844
Glucose	47.8	70.9	31	0.891
Fructose	78.9	86.9	5	0.634
Lactose	16	30.3	101	0.931

Maltose	44	58.3	87	
Sorbitol	73	83	-9	0.725
Xylitol	63	80	-29	
Erythritol	37	55	-42	
Mannitol	20	31	4.8	0.977
Maltitol	60	70	39	
Isomalt	25	45	63.6	
Lactitol	52	74	48	
Polydextrose	80		90.8	
Raffinose	22.9		70	
Corn Syrup (42 DE)			79	
Corn Syrup (20 DE)			139	

Table No. 01 Properties of Confectionery Product

Pancoast HM, Junk WR. (1980), Roos and Karel (1991), Noel et al. (1991), Roos (1995), Fennema (1996), Raudonus et al. (2000)

Solubility

The solubility of sweeteners depends on the specific interaction between the sweetener molecule and water. The solubility of sweeteners varies with temperature and the combination of different sugars. Hard-boiled confectionery products are a liquid mixture of sucrose, fructose, glucose, or maltose syrups, which are kept in an amorphous or glassy state. During processing sucrose decomposed into glucose and fructose. Syrups used in confectionery are the product of acid or enzyme-hydrolysed starch. Glucose syrup is acid hydrolysed which contains glucose as the prevailing component and maltose syrup is enzyme hydrolysed which contains maltose as the prevailing component. Syrups are a mixture of glucose and oligosaccharides contents based on glucosyl units. As per Anderson, hard candies are found in solid, super-cooled, and non-crystalline forms below the melting or softening point [Anderson L.J., 1995]. Candies are prepared by evaporation of water from a solution of sugar and syrup. After evaporation of water organic solid or liquid acid is applied for enhancing flavour and tartness in candies. Citric, malic, and tartaric acids are common solid acids used in candies. Buffer lactic acid and citric, lactic, and malic acid in combination with sodium lactate is used in deposited candies. Hydrolysis of sucrose shows an effect on the hygroscopicity of candies and reduces the cooling rate of candies during moulding. A decrease in cooling rate shows an effect on the sugar crystallization and hardness of candies [Shin K.D., Lim S.T., Kim H.I., 1998]. Crystallization of sugar-based confectionery products is a typical phenomenon because the moisture of hard candies and most of the confectionery products are very low except for jellies. Confectionery product without crystals gives good quality attributes and longer shelf life.

Glass Transition Temperature

As per Kauzmann, the glass transition temperature is the point or range of temperature where the transition between a glassy state and a more fluid-like rubbery state occurs (Kauzmann, 1948). Factors like molecular weight, degree of cross-linking of polymer and water concentration show an effect on the glass transition temperature of the product (Graaf et al., 1993). Sugar-based candies depend on the glass transition temperature (T_g) of the product. The quality of candies depends on the glass transition temperature. Crystal formation also depends

on T_g and T_g depends on the average molecular weight of the system [Gabarra P., Hartel R.W., 1996]. The molecular weight of water and, sweeteners are responsible for glass transition temperatures. In hard-boiled candies cooking mixture temperatures below the glass transition temperature and without crystal, formation gives longer shelf life and better sensory attributes.

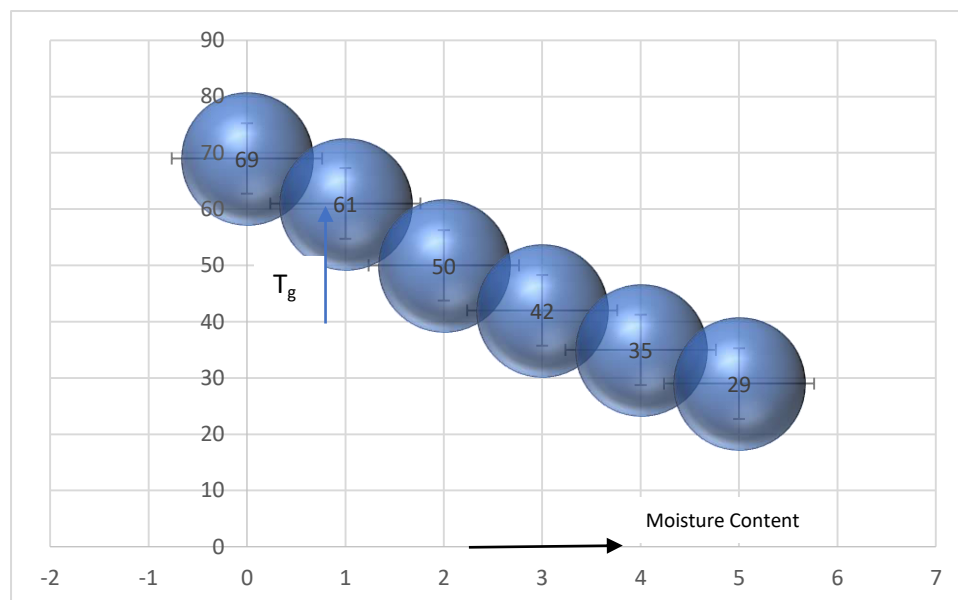


Figure No. 03 Effect of moisture content of sucrose on glass transition temperature (T_g) [Nowakowski, 2000]

Boiling point elevation

Manufacturing of confectionery by cooking sugar or sweetener along with water to a specific temperature to achieve desired texture by reducing water content at a specific level in the finished products. When the total vapour pressure of solution reaches ambient pressure called the boiling point of a solution. In confectionery product solutes like sugar, syrup, acid, and other additives decrease the vapour pressure of the solution which takes a higher temperature to reach the vapour pressure equal to ambient pressure [Walstra, 2003]. As per Norrish and Jackson, if the sugar solution concentration at higher than the boiling point temperature is highly inconsistent [Norrish, 1967; Jackson, 1995]. Evaporation of the product continues during the cooling of the product so exact measurement of water content at a specific boiling temperature is difficult. Rapid cooling helps to get accurate results so the industry follows rapid cooling in modern confectionery manufacturing. Rapid cooling is essential to obtain the most accurate results. Tables of boiling point elevation for various sugar solutions of importance to confections can be found in Norrish (1967) [Pancoast HM, Junk WR., 1980]; however, the values at high dissolved solids contents should be used with caution for the reasons noted above. The degree of a boiling point depends on the solute concentration and molecular weight of the ingredients. Glucose solution boils at higher temperatures than sucrose solution at an equivalent weight percentage (Jackson, 1995). Commonly, glucose syrup or maltose syrup is used in confectionery. Boiling point elevation depends on the composition of saccharides in syrup [Norrish, 1967, Pancoast HM, Junk WR. 1980]. Saccharide content is calculated in terms of dextrose equivalent in syrups, so higher dextrose equivalent (DE) of corn syrup gives higher boiling point elevation than lower DE corn syrup. The manufacturing

process and parameters also affect boiling point elevation. In industry 42 DE glucose syrup is used for better results. Pressure at the time of cooking is an important factor in boiling temperature (Jackson, 1995). During cooking rapid evaporation of water, it follows the boiling point elevation curve. Studying the boiling point elevation of sweeteners and ingredients is important to control product characteristics. Literature shows numerous data sources on the boiling point elevation of sucrose, corn syrup and invert syrups and their combination [Pancoast HM, Junk WR. 1980, Starzak M, Mathlouthi M. 2006]. It was found different results and opinions on boiling point elevation in past. The boiling point temperature is 127.5 °C (261.5 °F) for a 94% sucrose concentration [Starzak M, Mathlouthi M. 2006] whereas some other study shows it was 135.6 °C (276.1 °F) for the same sucrose concentration. Clear documentation compilation is done by Starzak and Mathlouthi in 2006 about sucrose-water solution for water activity, solubility, and boiling point elevation. They used the weighing method to standardize water activity and a single equation as a function of concentration and temperature [Zumbe A, Lee A, Storey D. 2001]

Moisture Content

Water used in the manufacturing of confectionery is to dissolve sugar and corn syrup with the help of proper mixing. Water used in the recipe varies from 20 to 35% of water by solid and depending on the product and method of cooking. Sometimes the water is not required for making syrup, corn syrup and liquid sugar content moisture to make it dissolve. The pH of water is one of the critical parameters for confectionery. If water is acidic, it enhances the inversion of sugar [Atkinson et al., 1952]. More inversion gives problems like discolouration of cooked candy mass and stickiness to the final product. The texture of confectionery depends on the moisture of the products [Jackson, 1995]. Confectionery products are known for low moisture products. Hard-boiled candy has 1 to 2% moisture, toffee and éclair have 6 to 8% moisture, Jellies contain 18 to 20% moisture and, compressed tablets contain less than 1% moisture. Sugar syrups contain 30 to 35% moisture. The water content of the final product depends on the water content of the ingredients and their concentration in the product [Cakebread, 1969]. Ingredients having lower molecular weight show the most effect on reducing water activity (a_w). Ingredients like protein, hydrocolloids and gums showed little effect on reducing water activity because of the high molecular weight of ingredients. In confectionery products, corn syrups, inverted syrup, fructose, glucose, polyols and, maltitol syrups act as humectants. Humectants reduce the water activity of the product. Humectant contains a hydroxyl group with an affinity to form a hydrogen bond with water molecules and promotes retention of water and helps to keep a product moist.

Migration of moisture

Migration of moisture happens in packed food. Migration will continue until the equilibrium two-phase achieve. During packing air is packed in the pack called headspace air. Moisture exchange also happens within the pack with this free air. Migration rates depend on the difference in relative humidity inside and outside the pack and the barrier properties of the packing material. Maintenance of good quality packaging material and equilibrium relative humidity (ERH) of the products to achieve the desired shelf life of the product. The physical and chemical properties of confectionery products are affected by the migration of moisture. Most of the time changes that happen due to moisture migration are detrimental and reduce

consumer acceptability toward the product. Candies lose moisture or pick up moisture depending on the water activity of candies and ambient storage relative humidity.

Moisture loss

Candies will lose moisture when the water activity of candies is greater than ambient relative humidity. Water loss causes dryness, and hardening of candies. Jellies, caramel and fudge, chewy candies, nougat and marshmallow, gummies, fondants, and creams, chewing and bubble gum, and soft-panned candies become harder after moisture loss. Lower water content gives a hard and brittle texture.

Moisture uptake

In sweet goods due to moisture uptake, numerous changes take place. The surface of confectionery products shows high diffusion than the interior of candy [Nowakowski and Hartel, 2002]. The quality of the product deteriorated because of moisture uptake. The surface of the candy gets sticky, difficult to remove candies from the pack due to surface stickiness. Water content in hard candies starts graining, softer texture. Surface water also leads to flavour loss. Flavour loss happens because in an amorphous structure flavour molecules are trapped. Sufficient moisture shows flavour molecular mobility to diffuse the candy matrix which leads to reduced flavour. The uptake of moisture also reduces the glass transition temperature of candy and the mobility of all molecules increases [Roos and Karel, 1991]. Crystallization and, graining in cotton candy and hard candies increased with water uptake [Lees, 1965]. Graining in candies give an adverse effect on the concentration of flavour in the crystallization zone and enhances flavour loss [Levi and Karel, 1995]

Confectionery Products

Category	Crystallinity (%)	Moisture (%)	a_w
Hard Boiled Candy	1-2	2-5	0.25-0.4
Fondants and Creams	35-55	10-18	0.65-0.8
Marshmallow	0-20	12-20	0.6-0.75
Nougat	0-20	5-10	0.4-4
Caramel, Fudge, Toffee	0-30	6-18	0.45-0.6
Chewy Candies	0-10	6-10	0.45-0.6
Chewing Gum	30-40	3-6	0.4-0.65
Gummies and Jellies	00	8-22	0.5-0.75
Jams	00	30-40	0.8-0.85
Soft Panned Coating	60-75	3-6	0.4-0.65
Hard Panned Coating	80-85	0-1	0.4-0.75
Tablets, Wafers and Lozenges	75-95	0-1	0.4-0.75

Table No. 02 Confectionery Product Specifications
Bussiere, G. and Serpelloni, M. (1985) ^a=estimated.

Hard-boiled Candy

Hard candy is in a glassy state made up of sugar, corn syrup, acid, colour, and flavour combination. Hard candies are subcooled, made with highly supersaturated sugar solution with high viscosity and very less moisture content (Kitt, 1993; Jeffery, 2001). Different application

in sugar confectionery comes under the name of hard-boiled candy like stamped candy, lollipops, cough drops, centre-filled (liquid or solid), and hard sweets. As per Jackson, hard-boiled candies are made with sugar, glucose syrup and water mixture, added with colour, flavour and acid. Sugar and liquid glucose are major and common ingredients used for making candies and the ratio may vary based on candy texture and properties of candies (Jackson, 1995). Hard-boiled candy corn syrup or liquid glucose syrup gives limited molecular mobility in the glassy state which gives more stability to the product. To get low moisture in the final product candy mixture was heated to 144-150 °C. After cooking, the cooked mass gets changed to a plastic amorphous state while cooling. There are two methods of candy formation. In deposited candy, colour, flavour, and acid dosing will be done online and deposited in the desired mould at the boiling stage only. In the formed or stamped method, after cooling colour, flavour and acid are added to the cooling table and mixed manually or by an automatic machine (Minifie, 1999). Hard-boiled candy product contains 1 to 3% moisture content for better stability. Product stability depends on equilibrium relative humidity (ERH). ERH of hard candies varies from 26 to 32% [Jackson 1995, Kitt 1993]. Stability is also influenced by glass transition temperature. Water content and types of sweeteners used for the formulation of hard-boiled candy determine the glass transition temperature of candies [Gabarra and Hartel, 1998; Nowakowski and Hartel, 2002; Smidova et al., 2004].

Cotton Candy

In confectionery, cotton candy is a characteristic product formed with fine threads or floss of sugar glass. The product is prepared by melting sugar and a combination of colour and flavoured sugar crystals. The mixture passed through a spinning device which gives a floss appearance without crystal formation because of rapid cooling in the spinning head. Cotton candy is affected by moisture uptake, collapse floss structure, and recrystallization because the surface area of the product is much more. Corn syrup or liquid glucose syrup is not used in cotton candy which gives limited inhibition of crystal formation. Study shows the stability of cotton candy depends on storage conditions. Crystallization is one of the most critical quality parameters in cotton candy. If the relative humidity of the storage area increases crystallization also increases. The stability of cotton candy will be more than two years if the relative humidity is less than 11% but if the relative humidity is more than 33% crystallization will start within three days [Labuza and Labuza 2004]. Crystallization also called graining which consider a defect in cotton candy. Crystallization increased because uptake of moisture and will cause a reduction of glass transition temperature (T_g). As a result of this sucrose, molecules mobilize sufficiently to form a crystal lattice.

Fondant and Creams

Some of the applications desired to have crystallization in products, fondants and creams are products with 50 to 60% crystallization in saturated sugar solution [Lees, 1965; Minifie, 1999; Jeffery, 2001].

Ingredient	Percentage	Remark
Sucrose	70-90%	Dry solid basis
Corn syrup/Liquid Glucose Syrup	10-30%	Dry Solid basis
Water	10-15%	-

General formulation of fondant and cream [Jeffery, 2001]

The texture of fondant or cream depends on several crystals, the distribution of crystals in the product, dissolved sugar content and water content in the final product. As per Jeffery, creams and fondants have multiple similarities including microstructural representation. Due to the high content of water cream become softer than fondants. Fondant has numerous small crystals and acts as a nucleus for recrystallizing sugar in toffees and fudge confectionery products. The cream contains air so the texture becomes softer. In confectionery products, sometimes enzymes like invertase are used to make soft fondant to create a creamy texture [Jeffery, 2001, Minifie, 1999]. Fondant used for graining or recrystallization of different confectionery products. Typically, fondant content is 50% crystals. Manufacturing of fondant includes Super saturated sugar mixture cooking (110 to 120 °C), a cooling in cooling drum (40 to 50 °C) and beating to form fondant.

Marshmallows

As per Minifie, Marshmallow is a combination of air bubbles and sugar syrup. Air bubbles surrounded sugar syrup known as Marshmallows [Minifie, 1971]. Syrup preparation is the most common method in confectionery using sugar, corn syrup or liquid glucose and water. After cooking air is incorporated with the help of mechanical agitation [Jeffery, 2001]. In Marshmallows stabilization of air and foam is the most critical parameter. To stabilize air and foam, stabilizers are used like gelatin, gum Arabic, different pectin, and proteins along with sugar [Minifie, 1971]. Marshmallow is low-density product, and the density of the product decreased due to foaming. Air or foam gives a light, fluffy texture to the product [Jeffery, 2001; Jackson, 1995; Minifie, 1971]. In the market, different types of Marshmallow products are available which are grained or ungrained. This is dependent on the sugar and corn syrup or liquid glucose ratio.

Parameters	Grained Marshmallow	Ungrained Marshmallow
Moisture Content	15-18%	5-10%
Density	0.5 – 0.7 g/ml	0.7 – 0.8 g/ml
ERH	60 – 65%	60 – 70%

Quality parameters of Marshmallow [Minifie, 1999]

Nougat

Nougat and Marshmallows consider similar products, in nougat fat and flavour are added to enhance characteristics. Nougat is made by whipping sugar syrup into foam by air incorporation. The firmness of nougat varied on the content of water and the state of sugar in the final product. Fat is deciding factor during the manufacturing and eating of nougat. Hard and soft nougat varies with the water content of 6% and 15-17% respectively [Minifie, 1999, Jeffery, 2001; Jackson, 1995]. Nougat having chewy (sugar molecules in amorphous form) or grained structure depends on whether sugar has recrystallized or not. The sugar and corn syrup

ratio decides the crystallization structure of the final product. The water activity of grained and chewy nougat is different. Chewy nougat has lower water activity at the same moisture content than grained nougat. ERH of grained nougat 60-78% and chewy nougat 40- 55% (Minifie, 1999).

Caramel and Fudge

In the confectionery market, caramel and fudge are made using similar ingredients like sugar, corn syrup, condensed milk, milk fat or vegetable fat, salt, stabilizer, flavour, and water. Fudge is a characteristic re-crystallized product Due to Millard and Caramelization reactions product gets desired colour and flavour [Jeffery, 2001; Jackson, 1995]. Caramel and Fudge products have a 45 – 60% ERH depending on moisture and sugar crystallization [Willis, 1998]. Caramel contains very less crystals (<10%) which give reduces the stickiness of the product. Protein and fat help to avoid sugar re-crystallization and prevent cold flow in the final product. The texture of caramel varies from soft to firm and hard depending on water content. If graining becomes more caramel gives a short texture. The composition of caramel and fudge, and the water content of the final product decide the shelf life of the product, graining of the product and quality deterioration (stickiness, de-shaping, etc.) [Lenz and Hartel, 2005]

Gum

Gum is the most typical confectionery product consisting of a rubbery texture consisting of polymers along with texturizers, sugar, flavours, and humectant agents which give a characteristic feature to the product. Bubble gum and chewing gum are the most common types of gums. To get the elastic property for blowing bubbles in bubble gum ingredients use which have higher molecular weight. For sweetness sugar, dextrose or corn syrup or liquid glucose (42 Dextrose equivalent syrup) [Jackson, 1995]. In chewing gum proper consistency is important to maintain first gum base gets melted and mixed with sweeteners and other functional ingredients. Gum products manufactured without water phase. The quality of gums and water activity of gum depends on water content, corn syrup or liquid glucose dextrose equivalent and specific gravity, sugar content and glycerin content. Gum product has a 50 – 60% ERH [Minifie, 1999]. Generally, gum products have 0.55 water activity. Gum products lose moisture and become hard and crumbly, so humectant is used in the formulation. The extended shelf life of gum coating is common in pallet gum products. Hard sugar shells provide protection and the product will be more stable. Liquid-center-filled gums are also famous for different flavour combinations. Peppermint, spearmint, menthol, and fruit flavours are commonly found in the market.

Jelly and Gummy Candies

Jellies and gummies products consist of high moisture soft bite, delicious taste, and smooth mouthfeel. Gelling agents like pectin; and carrageenan are used for the gelation of the product. Jelly contains 15 to 20% moisture and moist surface [Jeffery, 2001; Jackson, 1995]. Water content and gelling agent used in formulation decide the textural attributes of jellies and gummies. ERH of jelly products are 60-70% and water activity is 0.6-07 [Minifie, 1999]. Moulding with corn starch in mould gives the product skin and helps remove candies from mould. Some product drying is provided to reduce the surface moisture of the product and make it chewier. Drying time varies from 24 to 74 hours depending on the product and desired

moisture content [Sudharsan et al., 2004]. Drying jellies and gummies is a most important process, if drying happens very fast, the skin will form rapidly, and the surface of the product becomes hard and trap moisture inside the skin. During storage, moisture will trap inside called sweating [Sudharsan et al., 2004]. The speed at which drying occurs must be controlled. With new development paraffin oil spraying on mould will help to de-mould jellies.

Compressed Tablets

Compressed tables are manufactured from powder premix by giving very high pressure called compression. Powder premixes formulation is done with the help of sugar, dextrose, sorbitol, and mannitol. Xylitol is used for giving cooling compressed tablets. Binders play an important role in compressed tablet candies. Commonly, gum Arabic, gelatine, and alginates are used with magnesium stearate or stearic acid used in commercial products. Colour and flavours are used to get desired sensorial attributes. Compressed tables contain very less moisture and are stable for more time. The uniform mixing of all ingredients is a critical process in tablet products. If the mixing of ingredients is not uniform product will deteriorate taste and textural properties [Minifie, 1999; Jackson, 1995].

Wafers or Lozenges

Lozenges manufacture by extrusion method or by a traditional method like sheeting and cutting. To formulate the wafers product, mixing of powdered sugar, corn syrup or liquid glucose, water and gelling agent are mixed and form a dough. The dough contains 5-10% moisture. This dough passed through cold extrusion. Final product moisture is reduced by <4% by drying the product. With the help of drying water activity of wafers was reduced to <0.4 and give a better shelf life of the product.

Sugar Panned Candies

Panning or coating is a famous technique in confectionery. Consumers get attracted toward coated products. Soft panning and hard panning are types of panning. The shelf life and quality of the product depending on the coating and water content. A coating pan or rotating pan is a machine used for manufacturing panned candies. Pan rotates with a motor and coating material is added to the product to coat it uniformly. Jellybeans are examples of soft coating. Jelly in bean shape coated with syrups or other materials like seasoning etc. jellybeans contain higher moisture content, surface drying may be done to avoid moisture migration after coating. Fined-grained sugar and syrup are coated on the product to reach desired shape and size [Minifie, 1999]. The coating or panning material quantity varies from 20 to 30% of the final product.

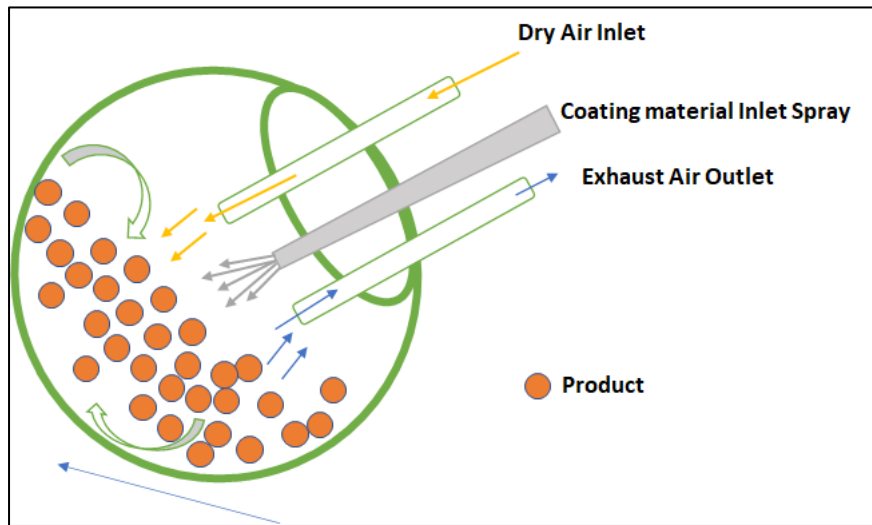


Figure No. 04 Design of Coating Pan

The texture of panned candies depends on the shell and center product moisture content. Crystallization also affects the texture of the product. During coating, drying of product in a controlled condition is important to produce a uniform coating. During storage, moisture migration may happen from the shell to the center or center to shell depending on the composition of the product. As per Troutman, an MRI study was done for jellybeans to measure changes in water content and water activity of the final product [Troutman 2002]. As per minifie, concentrated sugar syrup is used for coating hard-panned products [Minifie, 1999]. Drying after spraying syrup gives a better coating and helps with intense crystallization. Drying and crystallization are the most important factor for uniform and good quality panned products.

Conclusion

Confectionery is one of the most important food categories in fast moving consumer goods category. Products are available in different states and formats. Confectionery products contain low moisture and are stable for more time. The quality of sweet goods depends on moisture content, types of ingredients, relative humidity, and storage temperature. Advanced facility and development provided an advanced understanding of confectionery products and quality parameters. The shelf life of confectionery products depends on water activity (a_w), relative humidity, moisture content of the product, and packing materials. Making a product with good sensorial attributes and a stable product required continuous study. With the help of advanced technology and innovation in sweet goods.

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