

# CLASSROOM COPY - DO NOT REMOVE

## Chewing Gum

How Products Are Made | 1994 | Secrest, Rose | Copyright)

### Chewing Gum – Background

Chewing gum is a sweetened, flavored confection composed primarily of latex, both natural and artificial. Organic latex, a milky white fluid produced by a variety of seed plants, is best known as the principle component of rubber. Used as a snack, gum has no nutritive value, and, when people have finished chewing, they generally throw it away rather than swallow it.

Throughout history, people in many regions have selected naturally chewy and aromatic substances as breath fresheners or thirst quenchers. The Greeks used mastic tree resin; the Italians, frankincense; the West Indians, aromatic twigs; the Arabs, beeswax. Tree resins appear to have been the most popular, and spruce sap had been a favored chewing substance for centuries in [North America](#) before [New England](#) colonists adopted it for their own enjoyment. Although spruce gum was available to anyone willing to go out into the woods and extract it from a tree, John Curtis and his son, John Bacon Curtis, thought they could package and market it. In the mid-1800s, they experimented with the first manufacture of chewing gum sticks. First they boiled the spruce gum and skimmed off impurities such as bark before adding **sugar** and other fillers. Then they rolled it, let it cool, and cut it into sticks which they dipped in cornstarch, wrapped in paper, and placed in small wooden boxes. The Curtis company thrived, and business grew still further when the younger Curtis developed a machine to mass produce gum and founded the first chewing gum factory. The Curtis's manufacturing process is roughly the same one used to produce chewing gum today.

Despite the Curtis's success, very few other spruce gum factories were established during the nineteenth century. However, in 1869 William F. Semple took out the first patent on chewing gum. His formula was the earliest attempt to create latex-based gum, yet he never manufactured or marketed it. However, chewing gum as we know it today was first manufactured that year by Thomas Adams. Adams began mass-producing latex-based gum after meeting with the famous Mexican general Antonio López de Santa Anna, who wanted Adams to help him introduce chicle, a rubbery tree sap from the Sapodilla trees of [Mexico](#) and [Central America](#), as a cheap replacement for rubber. Adams could find no way of treating the chicle to render it useable, but he thought it would make an excellent chewing gum that could easily replace paraffin, the tasteless wax that dominated the chewing gum market at the time. To give his gum the proper size and consistency, Adams put the chicle in hot water until it was the consistency of putty. He then flavored it with sassafras and licorice, kneaded it, and shaped it into little balls. In 1871 Adams was the first to patent a gum-making machine. The machine kneaded the gum and ran it out in long, thin strips that could be cut off by druggists, who were the most common direct seller of chewing gum in the early days. Adams' venture proved successful, and his American Chicle Company and its gum are still around today.

The most successful chewing gum company ever is that established by William Wrigley, Jr., in 1892. Although the company, run by the founder's son and grandson after his death in 1932, developed a wide array of flavored gums, it dropped many of these to concentrate on its biggest sellers: "Juicy Fruit," "Doublemint," and "Wrigley's Spearmint." Recently, the company introduced gum for denture wearers, sugar-free gum, cinnamon-flavored gum, and non-stick bubble gum. Like earlier Wrigley products, all have proven popular. The secrets behind the success of Wrigley gums—the company has never made anything else—are strong flavor and prominent advertising. As William Wrigley, Jr., said early in the century, "Tell 'em quick and tell 'em often."

Today bubble gum is probably more popular than chewing gum, at least among young people. In 1906, however, the first attempt to make bubble gum failed when consumers found "Blibber Blubber" too wet and grainy. It wasn't until 1928 that Walter Diemer, a young employee of the Fleer company, developed an acceptable bubble gum, marketed as "Dubble Bubble." (The gum's familiar pink color was practically an accident: it was the color Fleer had most on hand.) During the 1930s and 1940s, the invention of synthetic rubbers assisted chewing gum manufacturers greatly, because they no longer had to rely on irregular supplies of imported natural rubber.

Although basic chewing gum has stayed about the same for over a century, several different types have recently become available. For instance, sugarless gum debuted in the 1970s, along with nicotine gum, liquid center gum, athlete's gum, chewing gum that doesn't stick to dental work, and bubble gum that doesn't stick to the face. More recently, some manufacturers have tried adding abrasives to chewing gum, marketing it as good for the teeth.

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## Raw Materials

The manufacture of chewing gum in the [United States](#) has come a long way from loggers chopping off wads of spruce gum for chewing pleasure, yet the base of the gum remains the sap of various rubber trees, or, in most cases, a synthetic substitute for such sap. Natural gum bases include latexes like chicle, jelutong, gutta-percha, and pine rosin. Increasingly, natural resins other than chicle have been used because chicle is in extremely short supply: a chicle tree yields only 35 ounces (one kilogram) of chicle every three to four years, and no chicle plantations were ever established. However, natural latex in general is being replaced by synthetic substitutes. Most modern chewing gum bases use either no natural rubber at all, or a minimal amount ranging from ten to twenty percent, with synthetic rubbers such as butadiene-styrene rubber, polyethylene, and polyvinyl acetate making up the rest.

After the latex used to form bases, the most common ingredient in chewing gum is some type of sweetener. A typical stick contains 79 percent sugar or artificial sweetener. Natural sugars include cane sugar, corn syrup, or dextrose, and artificial sweeteners can be saccharine or aspartame. Popular mint flavors such as spearmint and peppermint are usually provided by oils extracted from only the best, most aromatic plants. Thus, while the aroma of a stick of spearmint gum is quite strong, flavoring comprises only one percent of the gum's total weight. Fruit flavors generally derive from artificial flavorings, because the amount of fruit grown cannot meet the demand. For example, apple flavor comes from ethyl acetate, and cherry from benzaldehyde. In addition to sweeteners and flavorings, preservatives such as butylated hydroxytoluene and softeners like refined vegetable oil are added to keep the gum fresh, soft, and moist. Fillers such as calcium carbonate and corn starch are also common.

Federal regulations allow a typical list of ingredients on a pack of chewing gum to read like this: gum base, sugar, corn syrup, natural and/or artificial flavor, softeners, and BHT (added to preserve freshness). This vagueness is mainly due to the chewing gum manufacturers' insistence that all materials used are part of a trade secret formula.

## The Manufacturing Process

While the specific ingredients in gum might be a secret, the process for making gum is not. The first chewing gum making machine wasn't even patented, and today the procedure is considered standard throughout the industry.

### Preparing the chicle

1 If natural latex is to be used, it must first be harvested and processed. The tall 32.79 yard (30-meter) chicle tree is scored with a series of shallow Xs, enabling the chicle to flow down into a bucket. After a significant amount of chicle has accumulated, it is strained and placed in large kettles. Stirred constantly, it is boiled until it reduces to two-thirds of its original volume. It is then poured into greased wooden molds and shipped.

### Grinding, mixing, and drying the latex

2 The natural and/or artificial gum bases are first ground into a coarse meal and mixed to ensure uniform consistency. The blend is then placed in a warm room to dry for a day or two. During drying, hot air continually passes over the mixture.

### Cooking and purifying the base

3 Next, the gum base is cooked in kettles at 243 degrees Fahrenheit (116 degrees Celsius) until it has melted into a thick syrup. To purify it, workers pass it through screens and place it in a high speed centrifuge before refiltering it, this time through finer screens.

### Blending additional ingredients

4 The gum base is now ready for additives. It is placed in kettles to be cooked, and additional ingredients are stirred in by large steel blades. First, extremely fine powdered sugar and corn syrup are added. Flavorings are added next, followed by softeners. When the mixture is smooth enough, it is rolled out onto belts and cooled by being exposed to cold air.

### Kneading and rolling the gum

5 The next step is kneading. For several hours machines gently pummel the mass of chewing gum until it is properly rubbery and smooth. Large chunks are then chopped off the mass, to be flattened by rollers until they reach the proper thickness of nearly .17 inches (about .43 cm). During this process, the sheet of chewing gum is dusted with powdered sugar to prepare it for cutting.

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## Cutting and seasoning the gum

6 A cutting machine first scores the sheet in a pattern of rectangles, each 1.3 inches (3.3 centimeters) long and .449 of an inch (1.14 centimeters) wide. The sheet is then put aside at the proper temperature and humidity to "season."

## Packaging the gum

7 Once seasoned, the gum sheets are broken into sticks, wrapped in **aluminum foil** or wax paper, wrapped in paper, and put into plastic packs that are then sealed. Put into boxes or plastic bags, the gum is ready to be shipped to retail outlets.

## Other types of gum

8 Amazingly, gum balls make up only three percent of chewing gum sales, yet their unique merchandising makes them intriguing. Gumballs are made by scoring a cylinder of gum twice to form balls, which are then stored several hours at 55-60 degrees Fahrenheit (13-16 degrees Celsius) to harden. The balls are put into huge kettles to be coated with a flavored and colored sucrose solution. After seven hours, the coated balls are dried with hot air, then rolled in beeswax or other wax to make them shiny. The nature of gumball machines determined the next step. An enclosed plastic globe is subject to interior condensation. The water collected ruins untreated gumballs, so they are usually coated with a plastic, water-repellent glaze to protect them. Candy-coated gums are made in essentially the same way, their final destination being boxes, not gum-ball machines.

A recent development has been the introduction of gums with a liquid center. To make this gum, the gum base is extruded to form a hollow rope. The liquid is then fed into the hollow area, and a cutting machine chops the ropes into bite-size pieces and wraps them.

## Quality Control

Perhaps because chewing gum has always had a bad reputation as an unsanitary and crass junk food, but more likely because it is intended for human consumption, chewing gum factories have for decades been known for immaculate conditions.

Standards for raw materials are equally high. If natural rubber such as chicle is used, it must pass several tests for cleanliness and texture. Before shipment, chicle is inspected for rocks, dirt, and other obvious impurities. If it is too milky, dry, or dirty, it is rejected. Chewing gum is manufactured completely untouched by human hands, its entire production process taking place in clean, airconditioned facilities. Each ingredient is tested for purity before being used, and only the highest quality ingredients are accepted. Every large company has a research laboratory on its premises, thereby simplifying the standard procedure of inspecting and testing ingredients at every stage of the manufacturing process. The research and development department is also responsible for investigating new ways to produce and package gum, and for developing new products.

A successful piece of gum must be chewy and fresh, and bubble gum in particular must be both resilient and soft. With all types of gum, freshness and texture depend upon moistness. Gum must also contain the right amount of flavor oil. While too much solvent will make a gum sticky and hard to cut, it must contain enough flavor to mask the taste of the gum base and to last for a reasonably long time. For these reasons, the flavor oils used in gum are highly concentrated. A long shelf-life is also desirable, and every pack of gum is dated. After that date, the manufacturer asks that the gum be disposed of. To ensure that merchants do this, one manufacturer will replace unsold, out-of-date gum for free.

## The Future

Much current research is directed towards producing longer-lasting gum. At present, the flavor of a typical chewing gum lasts five minutes. The most promising idea for long-lasting gum entails coating each stick with a polymer film that releases flavor molecules slowly; studies suggest that the flavor of such gum can last more than ten hours. Another recent innovation is a chewing gum imbued with a patented compound that helps to repair tooth enamel. The compound, amorphous calcium phosphate, crystallizes when chewed, triggering the natural remineralization process by which the body rebuilds damaged teeth. Under ideal circumstances, the body generates enough amorphous calcium phosphate to repair teeth organically, but many people eat more sugar than their bodies can fight. This experimental gum would help to protect these people against tooth decay. Researchers hope to have the enhanced gum in stores by 1996.

—Rose Secrest

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## Where To Learn More

### Books

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### Cite this article

Secret, Rose. "[Chewing Gum](http://www.encyclopedia.com)." *How Products Are Made*. 1994. *Encyclopedia.com*. 12 Oct. 2011 <<http://www.encyclopedia.com>>.

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