

BUBBLE GUM: CALCULATING PERCENT SUGAR



INTRODUCTION:

Have you ever looked on a package of bubble gum to see what it was made of? The gum in bubble gum is made of sugar, flavorings and two different kinds of saps collected from the chicle and gutta siak trees. The chicle comes from the sap of the Manilkara, which is an evergreen tree grown in Mexico, Central America, and tropical sections of South America. Cuts are made at the base of the tree, and cups are hung below the cuts to collect the sap. This sap was found to be fun to chew—you could probably even blow bubbles with this sap just as it comes from the tree!

PURPOSE:

The percent by mass of sugar and flavoring in gum will be measured.

MATERIALS:

Balance
Bubble gum

SAFETY CONSIDERATIONS:

There are no special safety considerations. Students with braces or other oral appliances may be excused from participation in the chewing of the gum.

PROCEDURE:

1. Obtain one piece of bubble gum of the same brand and flavor for each member of your lab group. **Do not unwrap the gum.** Record the brand name and flavor on your data sheet.
2. While it is still wrapped, measure the total mass of all pieces of gum in your lab group. Record this on your data sheet.
3. **Without touching the gum**, remove the wrapper and place the gum in your mouth and chew it. Save your wrapper.
4. While you are chewing the gum, measure the total mass of all gum wrappers in your group.
5. Calculate the average mass of one piece of wrapped gum and record this on your data sheet.
6. Calculate the average mass of one gum wrapper. Record this on your data sheet.
7. Calculate the average mass of one piece of bubble gum and record this on your data sheet.
8. After fifteen minutes of chewing, remove the gum from your mouth with as little moisture as possible and **without touching** it place it back in its own gum wrapper.
9. Measure the total mass of the gum and wrappers for your group.
10. Calculate the percentage of sugar and flavorings in the gum using the following formula:
$$\text{Percentage sugar \& flavorings} = \frac{\text{Average mass sugar \& flavorings}}{\text{Average mass of gum before chewing}} \times 100\%$$

Name _____

Partner's Name(s) _____

Period _____ Date _____

DATA:

Before chewing

- a. Brand name of gum _____
- b. Flavor of gum _____
- c. Number of members in your group _____
- d. Total mass of wrapped bubble gum _____ g
- e. Total mass of gum wrappers _____ g
- f. Average mass of gum in wrapper (d / c) _____ g
- g. Average mass of wrapper (e / c) _____ g
- h. Average mass of one piece of gum (f – g) _____ g

After chewing

- i. Total mass of chewed bubble gum and Wrappers _____ g
- j. Average mass of one piece of chewed gum
[(i – e) / c] _____ g
- k. Average mass of sugar & flavorings in one
piece of gum (h – j) _____ g
- Percentage of sugar & flavorings in gum
100(k / h) _____ %

QUESTION:

1. How would the results be different if every student in a group chewed a different type of gum?

EXTENSIONS:

1. Determine how many packets of sugar are in one piece of gum. First describe the lab procedure necessary, have it approved by your teacher, and carry it out.
2. Compare results from all of the groups by graphing the results.

Bubble Gum History

WORDS OF WISDOM:

"I've done something with my life. I've made kids happy around the world." - Walter Diemer.

THE BUBBLE GUM STORY:

In 1928, bubble gum was invented by a man named Walter E. Diemer. Here's what Walter Diemer, the inventor himself, said about it just a year or two before he died: "It was an accident." "I was doing something else," Mr. Diemer explained, "and ended up with something with bubbles." And history took one giant pop forward. What Mr. Diemer was supposed to be doing, back in 1928, was working as an accountant for the Fleeer Chewing Gum Company in Philadelphia; what he wound up doing in his spare time was playing around with new gum recipes. But this latest brew of Walter Diemer's was -- unexpectedly, crucially -- different. It was less sticky than regular chewing gum. It also stretched more easily. Walter Diemer, 23 years old, saw the bubbles. He saw the possibilities. One day he carried a five-pound glop of the stuff to a grocery store; it sold out in a single afternoon.

Before long, the folks at Fleeer were marketing Diemer's creation and Diemer himself was teaching cheeky salesmen to blow bubbles, to demonstrate exactly what made this gum different from all other gums. The only food coloring in the factory was pink. Walter used it. That is why most bubble gum today is pink.

Gilbert Mustin, President of Fleeer named the gum Dubble Bubble and it controlled the bubble-gum market unchallenged for years, at least until Bazooka came along to share the wealth. Walter Diemer stayed with Fleeer for decades, eventually becoming a senior vice president.

He never received royalties for his invention, his wife told the newspapers, but he didn't seem to mind; knowing what he'd created was reward enough. Sometimes he'd invite a bunch of kids to the house and tell them the story of his wonderful, accidental invention. Then he'd hold bubble-blowing contests for them.

DID YOU KNOW?

- Dubble Bubble gum was so successful that the Fleeer Company sold over a million and a half dollars worth of gum in the first year.
- Today, the average American chews 300 sticks of gum a year.
- Did you know that chewing gum has been around for over 900 years?
- A leading columnist on the subject of etiquette tells a reader asking about chewing gum in public that it is perfectly all right to do so as long as it isn't done with too much gusto.
- In the United States alone, there are about 20 chewing gum manufacturers, with the Wrigley Company being the largest.
- In the United States, total retail sales of chewing gum (including bubble gum) is over \$2.0 billion.
- They can't make chocolate-flavored chewing gum. Unfortunately, the cocoa butter in chocolate acts as an emulsifier on chewing gum base, making it extremely soft, negatively affecting the chewing quality of the product.

- But why is bubble gum pink? Bubble gum is pink because when the big moment arrived, when destiny came calling on Walter Diemer, pink was the one and only shade of food coloring he had nearby.

More Facts About Gum

1. During WW1, US military personnel spread the popularity of chewing gum by trading it and giving it as gifts to people in Europe, Africa, Asia and around the world.
2. The first patent for chewing gum was issued in 1869 to William F. Semple, a dentist from Mount Vernon, Ohio.
3. Did you know that there are more than 1,000 varieties of gum manufactured and sold in the United States.
4. Cinnamon, Spearmint, and Peppermint are the most popular flavors of gum.
5. The largest bubble ever blown was 23 inches in diameter. The record was set on July 19, 1994 by Susan Montgomery Williams of Fresno California.
6. Tips for getting gum unstuck from clothing: try scraping off any excess gum with a dull knife and then rubbing the area with ice until the remaining gum rolls off into a ball.
7. How gum is made.
 - The gum's ingredients are melted and filtered.
 - Powdered sugar, glucose syrup, flavoring and the other ingredients are slowly added to the gum base until the warm mix thickness like dough.
 - Machines called extruders are used to blend, smooth, and form the gum.
 - It's time for gum to be shaped. Gum can be flattened and cut into sticks, or squeezed into a rope shape and cut into chunks, or molded into shapes, and candy coated.
 - After the gum is cut or molded into the appropriate shape, it's lightly sprinkled with powdered sweetener to keep it from sticking to machinery.
 - In carefully temperature controlled room, the gum is cooled for up to 48 hours. This allows the gum to properly set.
 - If the gum is candy coated, like most gum balls or pellet gum, it's sprayed again. This process is repeated several times until the candy shell reaches the proper thickness.
8. Some cool facts about gum from the past. Ancient Greeks chewed a gum like substance called mastic. Women especially liked gum because it cleaned their teeth and it exercised their jaw muscles.
9. The longest gum wrapper chain on record was 7,400 feet in length and was made by Cathy Ushler of Redmond, WA between 1969-1992.

“Fascinating facts about the invention of Bubble Gum by Walter Diemer in 1928” The Great Idea Finder. July 10, 2008.

<http://www.idealfinder.com/history/inventions/bubblegum.htm>

Ever Wonder How Bubble Gum is Made? by Matt O'Neal & Ricky Trogdon

How would you describe your favorite gum? Is it fruity? Extra chewy? Does it leave you with "minty" fresh breath? Have you ever stopped chewing long enough to speculate how that gum was made? If you have, you're in luck. You're going to find out everything you wanted to know- and maybe a little more. If you haven't, pop in a piece of your gum of choice and enjoy the read.

If you stretch to think of things you have in common with the ancient Greeks, stretch no further - they liked to chew gum too! They would chew the resin (a sticky, gummy material) from trees in their area. It's definitely not the same gum we're used to chewing. Even the Mayans chewed gum! Once it turned into a solid mass, they chewed the sap from a Sapodilla tree. Americans directly gained their knowledge of gum from Native Americans, who chewed the resin from Spruce trees. In fact, it was this type of gum that was first sold commercially.

Things are a bit different today. Since we're all very picky and we all like our own specific types of gum, scientists have to make synthetic substances to comprise the composition of our favorite chewy treats. That means that most of the time, these substances are not naturally found in nature. Although the exact recipes of the different types of gum vary, they are all made of the same basic ingredients: gum base, corn syrup, sugar. The gum's precise flavoring is also added. Naturally, gum manufacturers are very secretive when it comes to the exact recipes of their product. Now the ingredients have to be mixed together to form the composition of your gum of choice.

First, the gum base has to be melted into the form of a thick liquid consistency. Once it has reached this point, it's put in a high powered centrifuge to get rid of anything that shouldn't be in the product that reaches your mouth, such as dirt or bark (if the gum is from a natural substance). Once the gum base has been thoroughly cleaned, it's added to the mixers. At this point, powdered sugar and corn syrup are added. The powdered sugar helps the gum remain stretchy, and the corn syrup aids in keeping the gum moist and chewable. Softeners and flavoring are also added to the mixture.

Once the concoction is blended, it is laid on belts as it cools down. While this is happening, rollers smooth the gum down. The rollers can make the gum as thin as desired, depending on the type of gum that is being made. Obviously, sticks of gum are going to be thinner than gum balls. Once the preferred thickness is reached, the gum is cut. Stick gum is cut up into sticks (Who'd have thought?) and sent to another machine for individual wrapping. If the gum is being coated with candy, like gumballs, it is cut into the shape of a pencil and then processed through machines that put it into its ball form.

Have you ever been told that if you swallow a piece of gum it'll get stuck inside your digestive track for years? It's actually not true! Research shows that this is simply wrong and just an old wives tale. The gum you chew is an indigestible substance, which means that it cannot be broken down in our bodies. However, this doesn't mean that the gum you swallow is forever stuck in the pits of your stomach. It's just going to leave your body in the same condition that it came!

The next time you reach for your favorite piece of gum, think of the chemistry behind its making. Without the exact amounts of its ingredients, it wouldn't taste the same or even have the same consistency. Want to try it out for yourself? Try the Bubble Gum Making kits available at your favorite educational toy store and start making your own gum recipes. With Scientific Explorer's Ultimate Gum Kit, you can make up to 15 different flavors of gum! Who knows? Maybe your creation will be the next thing everyone wants to chew!

“Ever Wonder How Gum Is Made?” Go Articles. July 10, 2009.
<http://www.goarticles.com/cgi-bin/showa.cgi?C=807856>.