



by Josh Plaut

Next time you're chewing some bubble gum, take a look at the label. Hubba Bubba, Bubblicious, Dubble Bubble . . . no matter what the brand, the most important ingredients—the ones that make bubble gum an inflatable treat—are

listed simply as *gum base*.

"Gum base." The words don't tell you much. And with good reason. Gum makers closely guard their secrets.

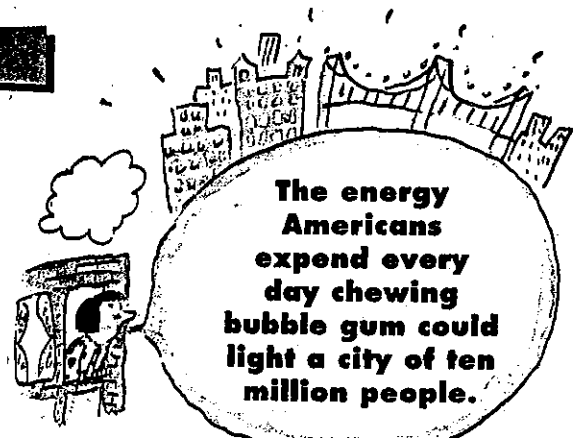
GUM, THE BASE-ICS

Secrets bug me, so I started searching for the lowdown on bubble gum. After numerous calls to

gum chemists, I found out just what gum base is: rubber, for the most part. It happens to be the basic ingredient in all gum—not just bubble gum.

Don't worry, it's not the same rubber used to make car tires. And it won't hurt you if you swallow it. It's there to give gum *elasticity*—the ability to stretch

CRET



The energy Americans expend every day chewing bubble gum could light a city of ten million people.

What would you say if someone offered you a wad of rubber, plastic, and wax? How about, "Thanks for the bubble gum!"



Chad Slattery (2)

out and then spring back. Without it, you may as well chew on sugar-coated broccoli.

HOW TO BREW A CHEW

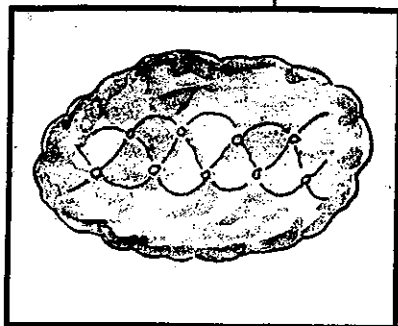
But if gum base were just rubber, "chomping on a wad would be like chewing on erasers," says chemist Raymond Roy. So gum chemists add other ingredients,

notably: *plastic*, which combines with rubber to make gum base easier to chew; and *waxes*, to keep the gum hard in the package. In your mouth, however, your body heat "melts" the waxes, softening the gum.

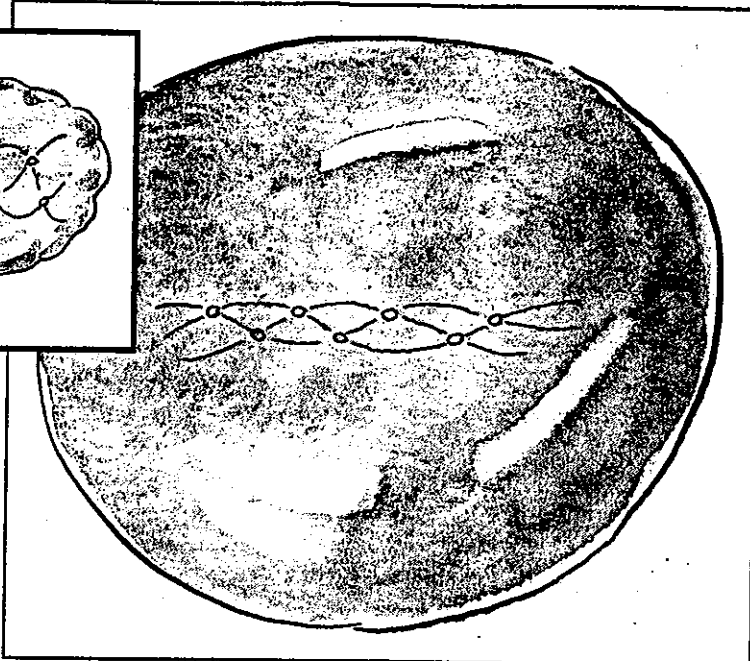
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Over the years, Americans have chomped on enough bubble gum to make a stick nearly 113 million miles long—long enough to reach the moon and back more than 200 times.

Laura Cornell (2)



What gives bubble gum its stretch? Long, chainlike polymer molecules. Before you blow a bubble, the polymers are arranged in "tangles" of overlapping chains (above).



When you blow, the force of your breath stretches these chains into long, orderly bundles (right). Result: The bubble expands. When the bubble bursts, the polymer bundles snap back into tangles.

Now, if someone asked you to chew on a wad of rubber, plastic, and wax, you'd probably say, "No way!" Unless it tasted really good. That's why gum chemists add flavorings and loads of sugar to their products. A few minutes after you start chewing, these substances dissolve in your saliva, giving you a high-power burst of flavor.

STRETCHING—THE TRUTH

If you ask me, once the flavor goes, a wad of gum is good for one thing only—blowing bubbles. But don't

try to blow any with regular gum. The gum breaks apart as soon as you attempt to inflate it. The reason: not enough rubber.

Bubble gum has a higher concentration of rubber. And it turns out that rubber is where the real secret of blowability lies.

If you could take a molecule-level look at the rubber in gum base, you'd see that it is made of giant molecules called *polymers*. A polymer is made of many smaller, identical molecules joined like the links in a chain. In gum rubber, the polymers are arranged in a loose "tangle" of overlapping chains (see diagram, above).

This structure may not be neat, but it makes the rubber stretchable. Scientists have a name for such stretchable (elastic) polymers. They call them *elastomers*.

How does the elastomer in gum base stretch? When you blow

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Bubble gum chewing, some scientists say, can help you work off muscle tension.

CHOOSE YOUR CHEWS

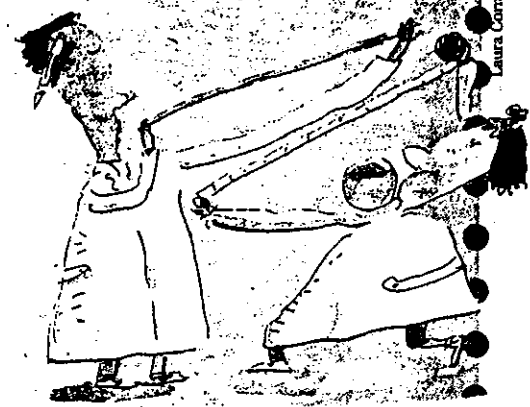


Amurok Products Company (2)
 If taste-testers like Shivani Desai (top) and Adam Hill (above) say "no go" to a new product, Amurok's gum makers go back to the drawing board.

POWER SCIENCE



Laura Cornell



To find out what kind of bubble gum kids like, the Amurol Company goes right to the source: They use 2,000 local kids as taste-testers. "We get to decide what kind of gum people chew," says 13-year-old Shivani Desai, a member of this "Candy Tasters Club."

If the kids give a product the "thumbs up," Amurol sends a shipment to stores. But if the candy tasters complain that a gum is no fun to chew, the experts might, for example, try to improve the gum's "initial mouth feel." That's how the gum feels in your mouth when you first pop it in. The experts will also check to see that the gum doesn't dry out or lose its flavor too quickly.

"Whatever we do," says Amurol's Ron Reem, "we have to end up with a nice soft piece of bubble gum." Otherwise, the candy tasters—and the rest of the country—won't like it.

How about doing some gum testing of your own? With a helper, you can experiment to find out, for example, which bubble gum has the most elasticity. More stretch is supposed to mean bigger bubbles. Is your favorite brand the tops?

WHAT YOU NEED:

- several brands of bubble gum
- scale or balance ● timer ● measuring tape
- pencil and paper ● data table (below)
- graph paper ● a helper

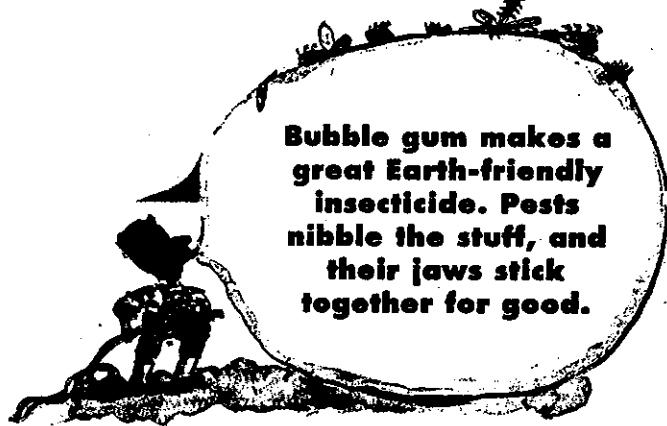
WHAT TO DO:

1. Measure out 4 grams of gum. (Test only one brand at a time.)
2. Chew the 4-gram portion for 3 minutes.
3. Take the wad out of your mouth and roll

WHAT NEXT?

Which gum stretched the farthest? Does this gum make the biggest bubbles? You'll probably want to do some more experiments to find out.

While you're at it, here are some other questions you might want to answer by experimenting: Which stretches more—regular or sugarless gum? Does the length of chewing time affect bubble size? How about temperature? Test whatever else sparks your interest. But remember, test only one variable at a time.



Bubble gum makes a great Earth-friendly insecticide. Pests nibble the stuff, and their jaws stick together for good.

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a bubble, the force of your breath straightens the polymer chains into long, orderly bundles, explains chemist Raymond Roy. Result: The bubble expands.

But that force strains the chemical bonds in the chains. If one of the bonds breaks... POP! The bubble springs a leak, the air rushes out, and the straightened chains recoil into tangles (see diagram, p. 18).

In regular gum, with a lower concentration of stretchy elastomer, the bonds break sooner (sometimes even before you pucker up). Sorry, no bubbles.

THE BUBBLE FACTOR

The actual size of the bubble you can blow depends on the non-elastic ingredients—like plastic—that gum chemists add to the gum base, chemist Roy says. More plastic and less elastomer mean less stretch.

It would be easy to make a

chunk of bubble gum that inflated to the size of a basketball, Roy says. "But when the bubble broke," he adds, "the gum would wrap around your head." The drawbacks are obvious. So most gum makers limit bubbles to the size of softballs.

Of course, bubble size also depends on the bubble-blower's skill. Why not stretch your favorite chew to the limit by experimenting with your technique? Maybe you'll be the next bubble champ of the world! ■

"Popsecret"
Bubble Gum and Polymers

1. What are elastomers?
2. What causes a bubble to pop?
3. What is the main component of "gum base"?
4. Why do they put rubber in gum?
5. What is the difference between regular chewing gum such as *Juicy Fruit* and big bubble gum such as *Bazooka*?
6. What makes gum taste good?
7. Can they make gum that will produce a bubble bigger than your head? Explain why or why not.
8. What is an "earth friendly" use for gum?
9. What gives gum its shape such as "stick form" or "round" in its package?
10. What is added to gum to make it easier to chew?
11. What happens to the polymers in gum as a bubble is blown larger and larger?
12. What happens when a bubble pops?