



Dear Beakman,  
Why is some plastic soft and other plastic breaks?  
Michael Roth  
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Dear Michael,  
Different plastics have different strengths. It all depends on the shape of the molecules that make up the plastic. A molecule is the smallest chunk of something you can have and still have it be the stuff you're talking about.

Plastics that bend have molecules that can slip and slide past each. Brittle plastics have molecules that hook onto and get hung up on each other.

*Beakman*  
Beakman Place

## experiment #1

**WHAT YOU NEED:** Permission from a grown-up helper - spaghetti - ovenproof bowls

### WHAT TO DO:

Ask your helper to boil a handful of spaghetti. Drain it really well and dump it in a bowl. Roast it uncovered at 375° for an hour. Let it cool completely.

In another bowl place another handful of uncooked spaghetti. Lift one strand out. Slip it back in.

Try lifting out a strand of the spaghetti from the other bowl. What happens?

### SO WHAT:

Flexible plastics are like these uncooked spaghetti. The molecules slip and slide against each other.

The molecules in brittle plastics hook onto each other. It's called *cross-linking*, and it's something like tangled-up spaghetti. When you tried to pull out a tangled spaghetti strand, it broke. That's what happens to the molecules of cross-linked plastics. The cassette case above is one example of a plastic that is cross-linked.

## TAKE ANOTHER LOOK

Flexible plastic is made from long chains of carbon and hydrogen atoms. Their strength comes from this long and flexible shape.

It's like a snake that can slide and curl without snapping. Brittle plastics don't slip and slide past each other.

This plastic is also very long-lasting. The molecule is too big to come apart easily. Plastic can last thousands of years and not decompose or rot.

That makes it a big trash problem. Some plastic can be recycled, and that's great. But most of the plastics used for packaging cannot be recycled – tons and tons and tons every day.

You Can help by buying plastic when you want something to last a long, long time. Don't buy plastic-wrapped stuff just to throw away the plastic. It's bad for the planet no matter what the advertising tells you.