

Dear Beakman,
Why do the wheels on cars have to be black?
Teddy Chase
Greenbrae,
California

Dear Teddy,
You are absolutely right. The wheels on cars do have to be black. The stuff that makes them black also makes them strong and last long. The wheels are called tires.

A very important part of science is sharing information. Gary Hamed is a tire scientist at the University of Akron in Ohio, and he shared his information on tires being black.

Beakman
Beakman Place

experiment #1

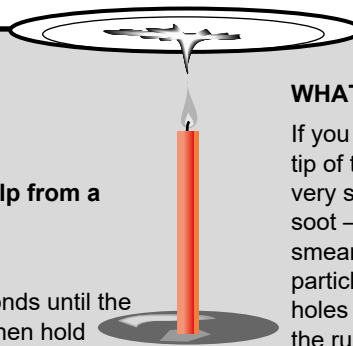
Make Carbon The Same Way
Tire Companies Do

WHAT YOU NEED:

A candle - a white china plate - help from a grown-up and permission

WHAT TO DO:

Light the candle and wait a few seconds until the wax at the top of it begins to melt. Then hold the plate over the flame and gently bring it down to the tip of the flame. Move the plate gently in a circle. The flame will paint the plate with carbon.



WHAT IS GOING ON:

If you look closely, you can see smoke at the tip of the flame. Smoke is a bunch of very, very small particles. The black particles are soot - carbon. Turn the plate over and lightly smear the carbon with your finger. These particles are so small they can fit into the holes in between rubber molecules. It makes the rubber stronger. Rubber factories used to make carbon by burning oil. This made the air very polluted and smelly.

Net of spaghetti

The molecules of rubber are very long and stringy. They are called polymers (POL-eh-mers). Imagine a plate of spaghetti. When it's cold, it sticks together. When it's hot and just cooked, it moves all around. Rubber molecules are long and stringy like spaghetti.

In 1839 Charles Goodyear dumped sulfur into rubber. It didn't get soft and mushy when it was heated. It was like tying knots in the spaghetti, making it into a net. The net of spaghetti didn't melt anymore, but it wasn't very strong.

It rubbed away like an eraser getting smaller. Scientists added carbon, and that made the rubber strong enough for tires. Carbon is a very small particle. The tiny bits of carbon attach to the holes in the net and make it strong. Carbon is black, so the rubber turns black. So do the tires.

rubber

There are a few things that will surprise you about rubber.

The first rubber was made from a kind of juice - called sap - that comes from trees. They are called rubber trees. Pure rubber, without any other chemicals in it, is as clear as water - colorless. Scientists call it *water-white*.

Rubber was named rubber by English scientist Joseph Priestley in 1770. He named this new stuff *rubber* because little lumps of it could be used to rub off pencil marks.

The things that make rubber a great eraser make it a lousy thing to build tires out of. Your eraser gets smaller as you use it. If tires were pure rubber, they would erase themselves away and last just a few miles.

