



THE INVENTION OF VULCANIZED RUBBER

Almost 3000 years ago, humans in Mesoamerica discovered an incredible material: natural rubber! The Olmec people (in modern day Mexico) were the first to use the sap of rubber trees to create flexible, bouncy balls for games. They also coated textiles in the sticky liquid to make them waterproof. Aztecs combined the sap with the liquid from pressed morning glory flowers to make the material stronger and more durable. Natural rubber is very different than the rubber we use commonly today. If it got too hot, the rubber would melt into a gooey, sticky mess.



When manufacturers and inventors in the USA first got rubber in the 1800s, they were excited about all of the possibilities! Rubber had a combination of material properties they had never seen before. It was flexible, lightweight, and waterproof. Inventors used it to make life vests and safety gear for sailors.



Unfortunately, natural rubber could not withstand temperature changes. When rubber got cold, it would lose its flexibility, get brittle, and crack. When it got hot, it would melt into a sticky pile of goo that smelled terrible!

Charles Goodyear was an inventor who became obsessed with improving rubber. He wanted to find a way to manage the negative material properties of rubber so inventors could use it in long-lasting products.

He tried mixing natural rubber with chemicals to see how its material properties would change. Turpentine, nitric acid, quicklime, magnesia, and more. Each experiment ended in messy, stinky failure. Some of his experiments even made him sick. He almost suffocated after combining chemicals that created a toxic gas!



One day, an accident led to his breakthrough! He dropped some rubber mixed with sulfur on a hot stove. The combination of heat and sulfur made the rubber much harder and more stable. It no longer melted around heat!

How was this possible? When Charles investigated what had happened, he discovered that sulfur and heat create stronger bonds between the molecules in the rubber. These bonds kept the rubber together, even in extreme heat.

It took several more years to perfect the process. He experimented by changing the amount of sulfur, the temperature of the oven, and how long he heated the mixed rubber. In 1844, he found a reliable process and patented it. He named it “vulcanization” after Vulcan, the Roman god of fire.

His hometown of Naugatuck, Connecticut became the home of the rubber industry. Customers wanted more rubber than Charles could produce. He sold the instructions for vulcanizing rubber to other factories so they could keep up with demand.

Vulcanized rubber changed the world! Before vulcanized rubber, tires were made of wood, leather, or iron. Charles's invention allowed bicycles, cars, and motorcycles to have rubber tires that were more safe, comfortable, and long-lasting.

Today, you'll find vulcanized rubber in your shoes, gloves, toys, erasers, and musical instruments. It's everywhere!

Rubber trees have spread to other tropical climates, like central America, Brazil, and Southeast Asia. In 2021, most of the world's natural rubber comes from Asia. Rubber is used in millions of products all around the world. Look around the room you're in. Can you find something made out of rubber?

