

NEW MATERIALS

INTRODUCTION

With the onset of World War II, the United States needed to make stuff fast. This situation itself caused shortages, but in addition, access to many resources was restricted due to conflict.

This restriction made itself most obvious in the shortage of plastics and fibers. For the first time it became really necessary to make polymers synthetically instead of just modifying natural products.

Designing polymers for specific purposes became a big industry. In reality, the work with polymers had just begun by the end of World War II. Once the process began, however, these synthetic polymers dominated industrial manufacturing, and they still do.

In New Materials, students will read about synthetic polymers and watch a demonstration of Styrofoam dissolving.

MATERIALS

- + Metal or glass bowl
- + Styrofoam cup
- + Nail polish remover

STANDARDS

NGSS MS PS1-2

Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.

NGSS MS PS1-3

Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.

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Students will consider chemical reactions and will engage in making some occur. These activities allow them to Plan and Carry Out Investigations and Engage in Argument from Evidence (Science and Engineering Practices) if you allow the students to make different attempts at the reactions with different formulas and to discuss whether or not the result is a chemical change.

NAME:

DATE:

NEW MATERIALS

Look around the room. What are all the things in the room made of? What are your clothes, your backpack, and your shoes made of? Chances are good that the answer to all of these questions is polymers and that they are synthetic polymers.

Polymers are big molecules made of repeating smaller parts. Those smaller parts are called monomers. For example, sugars make chains, and long chains of sugars are cellulose (paper) or starch (potatoes or bread). Synthetic means people made it. Bread and paper are natural polymers; styrofoam and polyester are synthetic ones.

When World War II started, people used mostly natural materials. Nearly everything was made of metal, wood, or glass. Clothes were made of cotton, wool, linen, or silk. Tires and shoe soles were composed of rubber from trees.

Scientists had known how to make their own polymers for decades, but natural sources were so inexpensive and plentiful that there was no need to use them. But that situation changed quickly.

The United States needed lots of rubber for Jeep and airplane tires, for tank treads, for soldier's boots, and for wiring. There was no way to get all that rubber from plants, especially since the plants were grown on islands now controlled by the Japanese. Silk was grown in Asia, and it was used for parachutes and pantyhose. Women turned in their pantyhose to make more parachutes, but their actions weren't enough.

Scientists needed to make more synthetic polymers and to make them have the properties that were needed.

Watch the demonstration with the styrofoam cup. Make observations and explain what you think happened.

Fill in the data table below. What are the things in the classroom made of? Are they natural or synthetic?

OBJECT	MADE OF	SYNTHETIC OR NATURAL