

The Next Generation Science Standards (NGSS)

CHAPTER 6, LESSON 12: RESEARCHING SYNTHETIC MATERIALS AND THEIR IMPACT ON SOCIETY

MS-PS1-3. Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.

DISCIPLINARY CORE IDEAS

PS1.A: Structure and Properties of Matter

- Each pure substance has characteristic physical and chemical properties that can be used to identify it. (MS-PS1-3)

PS1.B: Chemical Reactions

- Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants. (MS-PS1-3)

Students conduct an activity in which they combine a sodium alginate solution with a calcium chloride solution. The combined solutions undergo a change to become a long semi-solid gel-like substance that students pull out of a cup as a gel “worm”. Molecular model illustrations are used to show the crosslinking process that created the new substance that has different properties than the reactants.

SCIENCE AND ENGINEERING PRACTICES

Obtaining, Evaluating, and Communicating Information

- Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used and describe how they are supported or not supported by evidence. (MS-PS1-3)

Students do research on a synthetic product such as plastic bottles, aspirin, or Kevlar. They discover the natural resources the product is made from, and the chemical processes used to make it. Students also research the positive and negative impact that producing the product has on society compared to producing a more natural product with a similar function.

CROSSCUTTING CONCEPTS

Structure and Function

- Structures can be designed to serve particular functions by taking into account properties of different materials and how materials can be shaped and used. (MS-PS1-3)

Students combine two liquids and see that the properties of the synthetic product is different from the original properties of the reactants.

Students also research other synthetic products and the chemical processes that go into making them. Students see that on the molecular level, substances have characteristic properties and that scientists can design ways of combining them to produce substances with different properties for particular functions.