



New Physical Science Curriculum for youth in grades 3-5

## Sustainable Polymers: Plastics of the Future for a Green, Clean World

### A 4-H STEM Curriculum for Grades 3-5

**Developed by:** A partnership between the University of Minnesota Center for Sustainable Polymers, University of Minnesota Extension, University of California Agriculture and Natural Resources, Cornell University Cooperative Extension, and *SciGirls*. This work is supported by the National Science Foundation (NSF) under the Center for Sustainable Polymers CHE-1901635.

**Target Audience:** Youth in grades 3-5 (8 to 12 year olds)

**Free download at:** [www.4hpolymers.org](http://www.4hpolymers.org)

#### *Sustainable Polymers: Plastics of the Future for a Green, Clean World*

is an inquiry-based science curriculum focusing on the following concepts: materials; plastics and polymers; refuse, reduce, reuse, recycle; and the work of scientists and engineers. The curriculum is designed to build the eight practices of science and engineering in the Next Generation Science Standards. The curriculum contains six learning modules intended for delivery in out-of-school time facilitated by an educator (trained adult or teen volunteers or program staff). Modules also include the “Science At Home” handout with learning activities to extend the learning.

#### **Modules:**

##### **1. Be a Scientist**

Youth will explore materials and their properties. Youth first consider what they think a scientist looks like and does, using the Draw-A-Scientist assessment. They become slime scientists by practicing many of the skills used by scientists as they test slime materials. By using what they discover, youth will create their own improved slime to meet their specifications.

##### **2. Materials Matter**

Youth explore materials and their properties and explore the concepts of monomer, polymer, and molecule. Youth investigate how chains of molecules that make up polymers and plastics affect the function of an object, and conduct a test to see how heat affects different types of plastics. Youth discover the wide range of functions of polymers and consider some of the benefits and challenges of this material.

##### **3. Plastics in Your World**

Youth will be introduced to different kinds of plastics that are used in daily life. Specifically, youth will analyze various plastic scraps by sight, touch, smell, and sound. They will categorize plastics based on the U.S. 1-7 plastic numbering system.

##### **4. Plastics in Our World**

Youth will explore the many ways in which they encounter plastics in their daily lives and consider some of the challenges our world faces with the global prevalence of plastic. Working in teams they will discover and evaluate disposal options for plastics such as recycling, landfill, reuse, repurpose, and industrial composting.

Youth will identify ways to reduce waste by choosing to refuse single use plastics and create an upcycled item of their own design.

### 5. Buy, Sell, Build

Youth discover more about renewable and nonrenewable resources through a game, in which they buy and sell resources at the marketplace in order to create plastics. As resources are depleted or replenished, youth discover strategies to sustain building when supplies are limited.




### 6. Service Learning

Youth apply science knowledge and skills to a real-world situation by designing and participating in a service learning project. Youth identify a need or problem related to materials or plastics and create a plan to address it.

### Supplies:

Activities use inexpensive and easy-to-obtain supplies. A materials list is provided. A kit including some of the materials, including children’s literature used in the modules, may be provided.

### Project Contacts:

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