Polymer Prodigies

Primary Curriculum	Grade 2
Supplemental Curriculum	Grades 2–5
Notes	Milk polymer composite requires 1 week to dry. Standard unit/refill kit comes with enough materials for 30 students.

Description

How can you change the properties of materials?

Metals are conductors and plastics are insulators, right? End of story.

Or is it?

We know plastics are currently on everyone's naughty list, but the ability to control their chemistry enables us to do amazing things. Join Volha, Jason, Anne, and others as they talk about all the cool ways they are controlling the properties of plastics and polymeric materials.

Using the overarching phenomenon of how something can be easy to break sometimes and harder to break at other times, students explore the properties of materials and how you can change them to solve challenges as they ask themselves: *"What can I do with this material?"*

Main Investigations

It's What's Inside That Counts – Slime Investigations

Magnetic Slime

Polymer Composite Creations

Number of Lessons*

Full unit – 20 lessons
Supplemental program – minimum 5 lessons
(milk polymer composite requires 1 week to dry)

**Lesson = 30–40 min. block, 50% of full unit lessons can be delivered in non-science classes*

Best Suited For

- Classroom science instruction (Grade 2)
- Summer camps (Grades 2–5+, minimum 1 week)
- Afterschool programs that have regular attendance (Grades 2–5)

Overarching Enduring Understanding

How do physical properties of a material connect to what I can use it for?

Number of Lessons*

Full unit – 20 lessons

Supplemental program – minimum 5 lessons (milk polymer composites need ~1 week to dry)

**Lesson = 30 – 40 min block, 50% of full unit lessons can be delivered in non-science classes*

FLOW OF INSTRUCTION

Introductory Investigation: Material Sort (hands-on investigation, occurs during week 1)

In this investigation students start with a bag of objects and must organize them in several different ways. To begin students may be given a few categories to pick, but as they continue through additional categorization rounds they must decide on the categories themselves.

Design Challenge: Paper Clip Polymers (hands-on challenge, occurs during week 2)

During this challenge students are given sets of different sized paper clips that they must attach to form a chain or net however they want. Groups must compare and contrast the "chains" and brainstorm how the different structures might be well suited for different purposes.

Investigation: It's What's Inside That Counts (hands-on investigation, occurs during weeks 3 and 4)

In a fun twist on everyone's favorite slime making activity, students will investigate the impact of different additives on the physical properties of their slime creations.

Design Challenge: Composite Creations (hands-on challenge, occurs during weeks 5–8)

During this challenge students will learn about, create, and compare different polymer composites. As they learn about the various applications of composite materials they will test and compare the perform of their own creations.

Grade 2

(NGSS Standards:2-PS1-1, 2-PS1-2, 2-PS1-3, K-2-ETS1-1, K-2-ETS1-2, K-2-ETS1-3)

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FLOW OF INSTRUCTION

2-PS1-1

Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.

2-PS1-2

Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.

2-PS1-3

Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.

K-2-ETS1-1

Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

K-2-ETS1-2

Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

K-2-ETS1-3

Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

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During this challenge students are given sets of different sized paper clips that they must attach to form a chain or net however they want. Groups must compare and contrast the “chains” and brainstorm how the different structures might be well suited for different purposes. (2-PS1-2,3).

Investigation: It’s What’s Inside That Counts (hands-on investigation, occurs during weeks 3 and 4)

In a fun twist on everyone’s favorite slime making activity, students will investigate the impact of different additives on the physical properties of their slime creations. (2-PS1-1)

Design Challenge: Composite Creations (hands-on challenge, occurs during weeks 5–8)

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