Polymers

Teach 1	Names of student(s) teaching:
Teach date: Teach time: Teach length: 45 minutes	Title of lesson: Polymers Source (Kit, Lesson, Page #):

Concept statement/Main idea:
Polymers are made up of many things; many polymers can make up something

Standards for the lesson:
PS1.A: Structure and Properties of Matter Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by other means. A model showing that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon and the effects of air on larger particles or objects. (5-PS1-1) Measurements of a variety of properties can be used to identify materials. (Boundary: At this grade level, mass and weight are not distinguished, and no attempt is made to define the unseen particles or explain the atomic-scale mechanism of evaporation and condensation.) (5-PS1-3)

Objectives	Evaluation
Write objectives in SWBAT form	Write at least one question to match the objective you listed or describe what you will look at to be sure that students can do this.
SWBAT **classify** various types of plastics based on the polymers they are made of that are used in everyday life.	3. Which of the following was **NOT** a characteristic of the plastic's physical appearance? A. Cloudy B. Opaque C. Clear D. Dusty

Engagement

Estimated time: 10 minutes

Description of activity: The teacher will make “flubber” in front of the class while explaining polymers and the definition for polymers.

What the teacher does	What the student does	Possible questions to ask students — think like a student and consider possible student responses
The teacher will introduce the word “polymer” to the students and break down the word as they define it to the students (poly=many). The teacher will say that many things can make up a polymer. The teacher will use borax, glue, water, and food coloring to make “flubber”, and ask the students what the ingredients for “flubber” represent. The teacher will then state or re-state a correct answer saying that the ingredients are what makes up the “flubber”; ingredients=polymers. The teacher will then ask the students to describe the physical characteristics of flubber. The teacher will tell the students that polymers make up everyday items such as plastic. The teacher will then state the physical characteristics of plastic that can be used to distinguish between the various types of plastic. The teacher will show the slide with the different comparisons of plastic and	The students will answer the questions the teacher asks and come up with the conclusion that the ingredients for “flubber” are polymers.	What do the ingredients for flubber represent? What are the physical characteristics for flubber? How do you know it’s flubber? Can you use physical characteristics to describe other objects?

will introduce the 6 major polymers of plastic to the students.		

Resources needed:
Borax, water, food coloring, and glue.

Safety considerations:
Do not ingest the flubber.

Exploration

Estimated time: 5-10 minutes
Description of activity: Students will match unknown pieces of plastic to their appropriate polymer.

What the teacher does	What the student does	Possible questions to ask students — think like a student and consider possible student responses
The teacher will monitor the student activity and answer any questions the students may have throughout the lab.	Students will identify the unknown piece of plastic based off of its physical characteristics. Students are given 6 unknown pieces of plastic and will identify them and fill out the "explore" portion of their worksheet.	Why do you think that plastic belongs to that polymer? What characteristics have you noticed about _____ polymer?

Resources needed:
Polymer Explore WS
Various plastics, water, and a container.

Safety considerations:
Do not drink the water.

Explanation

Estimated time: 5 minutes

Description of activity: Students will discuss their methods behind the classifications they came up with in the exploration.

What the teacher does	What the student does	Possible questions to ask students — think like a student and consider possible student responses
The teacher will ask students how they classified the different plastics they were given.	The students will share their reasoning behind their clarifications and will answer questions in a group discussion.	Do you think the different characteristics of the plastics strongly helped you identify what polymer it belonged to? What plastics were easier to identify? What plastics were harder to identify? What methods worked to distinguish the plastics? What methods didn't work?

Resources needed:

Polymer Explore WS

Safety considerations:

Elaboration

Estimated time: 5 minutes

Description of activity: Students will each be given a rock to describe to the class. Then they will try and classify them as igneous, metamorphic, or sedimentary.

What the teacher does	What the student does	Possible questions to ask students — think like a student and consider possible student responses

The teacher will connect RIC to recycling; the teacher will demonstrate to students how to recycle plastic based on their polymer number. Also, the teacher will connect the idea that the method students used to separate the plastics is similar to the method recycling plants use to recycle various forms of plastic.	The student will answer questions the teacher proposes and will ask any question about the plastic recycling process.	Do you think other facilities use a specific method to separate plastics similar to how you separated the plastics? Why do you think separating by their RIC is important?

Resources needed:
Worksheets

Safety considerations:

Evaluation

Estimated time: 5 minutes
Description of activity: Students will have a worksheet where they will answer the evaluation questions.

What the teacher does	What the student does	Possible questions to ask students — think like a student and consider possible student responses
Administers the quiz for students to complete on their own based on the information they just learned.	The student will complete the quiz on their own.	

Resources needed:
Evaluation Quiz

Safety considerations:

Name:_____
Date:_____

Polymer Activity Sheet

Directions: Complete the activity sheet as you identify the various types of plastics based on their polymers

Polymer Name	Polymer abbreviation	Rigidity (low, medium, or high)	Floatability	Clear/ Cloudy/ Opaque

Name:_____
Date:_____

Polymer Evaluation

1. A polymer is:
   A) A long string of a single molecule
   B) Multiple monomers put together
   C) The main ingredient for "Flubber"

2. True or False: Many polymers have different physical properties?
   A) True
   B) False

3. Which of the following was **NOT** a characteristic of the plastics physical appearance?
   A) Cloudy
   B) Opaque
   C) Clear
   D) Dusty