MEGA MOLECULES

STUDENT WORKBOOK

ACCELERATE

ACTIVITY 2

LINKED TOGETHER

In Activity 1, you found that mixing borax and water, or glue and water didn't result in a new substance. However, when you mixed borax, glue, and water, something special happened: a new, bouncy substance formed. In this activity, you'll categorize the changes that do or do not result in new substances, and discover the world of polymers!

LEARNING GOALS:

- I can use evidence about properties before and after a change to decide if the change was a chemical reaction.
- I can use evidence to show that synthetic materials are made from natural resources and affect society today.

3 MAKING CHAINS

In Activity 1, you mixed borax and water, and glue and water. These mixtures did not make new substances, but a change did happen. In chemistry, we organize changes into two types – **physical change** and **chemical change**. A physical change is when an object or substance changes in appearance but not its identity. The borax dissolved in water, but it was still borax and water. The glue and water made watery glue, but there was still water and glue.

You also made a bouncy ball with three things – borax, glue, and water. When you mixed these three things together, you made something new: a bouncy ball. This was a chemical change, or when an object or substance changes its identity. For the bouncy ball, the evidence of a chemical change was a solid forming in the solution of borax, glue, and water. You didn't have borax, glue, and water anymore, but a new substance with a new identity.

Monomer
A monomer is a small molecule.

Polymer
A polymer is a long-chain molecule made of many monomers.

4 ALMOST EVERYTHING

Polymers are almost everywhere you look. Have you ever seen a milk jug, rubber band, or a plastic grocery bag? Those are all polymers.

Polymers have special properties that make them ideal for doing all sorts of things. What are polymers like? Some of the properties of polymers include:


Resistance to chemicals

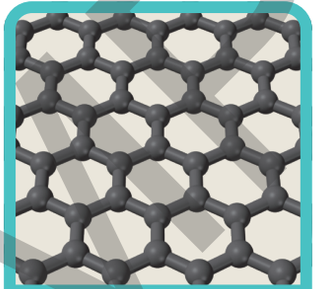

Good insulators

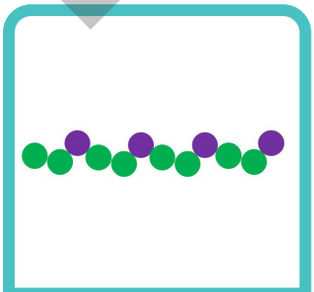

Strong, but light


lots of shapes, sizes, and colors

Are all polymers the same? Do all polymers have all of those properties? Nope. They can be three-dimensional, two-dimensional, or one-dimensional.

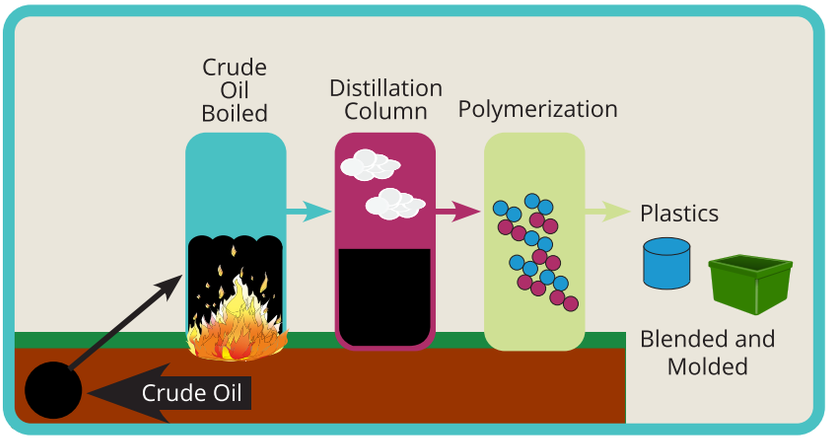

Three-Dimensional


Two-Dimensional


One-Dimensional

Most plastics are polymers, made from crude oil. There are many steps to making plastics.

First, crude oil is taken out of the ground. Then, it is heated until it boils. The boiling liquid moves into a distillation column. There, it separates into different oils, currently in a gas phase, rather than a liquid phase. The different gases go through polymerization to become polymers. The polymers are mixed and molded to form plastics.



STEP 6

When the gelatin becomes rubbery, make a hole at one end and remove it from the petri dish.

STEP 7 Let the gelatin harden overnight.

STEP 8

Once it dries, take your suncatcher out of the petri dish, loop the chenille stem through the hole, and hang it in a window.

THINK ABOUT IT!

1. Was the suncatcher you made due to a physical or chemical change? Explain.

2. What was the polymer in the experiment you performed?

3. What would you change about the suncatcher polymer to improve the product you made?

4. Do you know of other polymers that might work as well or better for this activity?

Burning Calories

Even when you are laying completely still, your body still requires energy to function. Figure out how many calories you burn per hour doing these common activities. One example is shown so you know how to calculate for yourself.

Activity	Your BMR		Calories burned per hour of activity		Total calories burned in an hour
Ex. Child sleeping	32	+	(32 X 0)	=	32
Sleeping		+	(_____ X 0)	=	
Sitting		+	(_____ X 0.2)	=	
Standing		+	(_____ X 0.5)	=	
Walking		+	(_____ X 2.0)	=	
Running		+	(_____ X 7.0)	=	
Writing		+	(_____ X 0.4)	=	
Typing		+	(_____ X 1.0)	=	
Getting Dressed		+	(_____ X 0.8)	=	
Chores		+	(_____ X 2.0)	=	

Which activity burns the most calories? _____

Which activity burns the least calories? _____

Were you surprised by how many calories you burn during a specific activity? Explain.

Notes:

ACCELERATE

SCIENCE UNLOCKED

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Kit	SU-MEGMOL
Instructions	IN-MEGMOLS
Revision Date	4/2021