

Enrich

Describing Matter

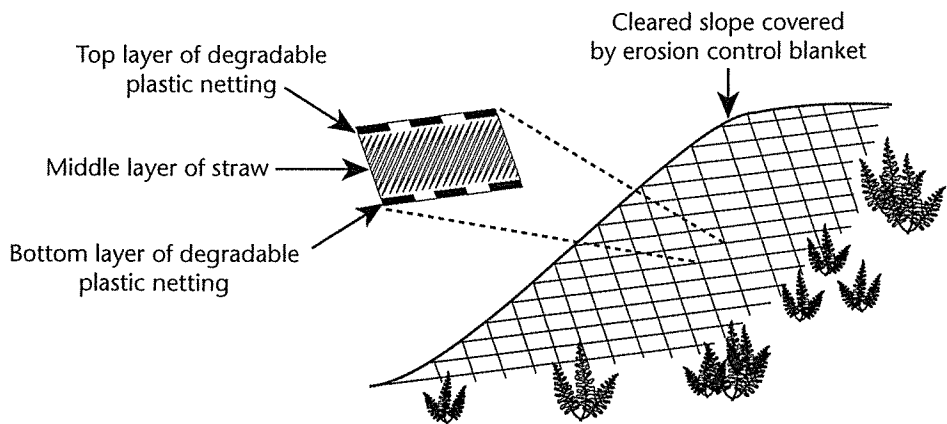
Read the passage and study the diagram below it. Then use a separate sheet of paper to answer the questions that follow.

Degradable Plastics

A chemical property is a characteristic of a substance that describes its ability to change into different substances. One way in which substances are changed is to be broken down into simpler substances. Materials that are *degradable* can be broken down easily in the environment. Most plastics are not degradable, remaining in the environment for a long time. But Today there are two main types of plastics that are degradable: photodegradable (*photo*-means "light") and biodegradable (*bio*- means "life").

Photodegradable plastics break down into smaller pieces after exposure to a certain amount of sunlight. *Biodegradable* plastics contain natural substances in addition to the plastic. The most common additive is cornstarch. Cornstarch is made up of sugar that is broken down by microorganisms. When this happens, the plastic breaks down into smaller pieces.

One area in which degradable plastics are being used today involves erosion control. In places where land has been cleared, such as during highway construction, erosion control blankets made with layers of degradable plastic and straw can be placed on the soil. The blanket keeps the soil from being washed away until new plants have a chance to grow. Once the blanket has broken down, the plants' roots will be able to keep the soil in place.



1. Do you think photodegradable plastic that is buried in a landfill will break down quickly? Explain.
2. Most landfills contain very little air and moisture, which many microorganisms need to survive. How do you think these conditions affect biodegradable plastic buried in a landfill?
3. Why do you think it is important that an erosion control blanket break down after a few weeks or months?

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Classifying Matter

Collect the items in the materials list and perform the steps in the procedure. Then answer the questions that follow on a separate piece of paper.

Separating a Mixture

Materials

- mixture made of sand, sugar, and wood chips
- plastic dishpan
- strainer
- slotted spoon
- coffee filters
- measuring cup
- tap water
- colander
- wooden spoons

Procedure

1. Place several cups of the sand, sugar, and wood chip mixture in the plastic dishpan.
2. Carefully add enough water to the dishpan to cover the mixture.
3. Devise a plan to separate the three ingredients in the mixture, using only the materials listed above.
4. After obtaining your teacher's approval, try out your plan.

Analyze and Conclude

1. How were you able to separate the wood chips from the mixture?
2. How were you able to separate the sand from the mixture?
3. How could you separate the sugar from the mixture?
4. Did any of the ingredients form a solution with the water? How can you tell?

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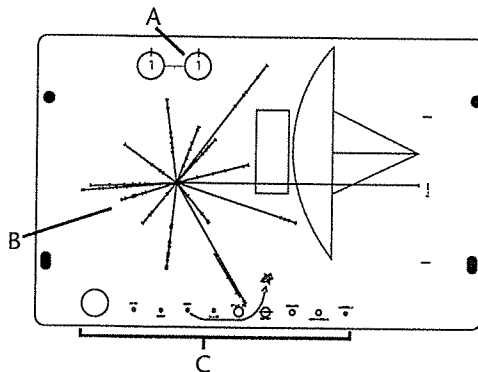
Measuring Matter

Read the passage and study the figure below it. Then use a separate sheet of paper to answer the questions that follow.

Units of Measurement and Shared Knowledge

Communication among scientists is easier when they all use the same standard units of measurement. Imagine trying to communicate information to a civilization on another planet. You do not speak the same language. You may not even share the same knowledge. In 1972, scientists working on the *Pioneer 10* spacecraft faced these problems. Because this was the first spacecraft to leave the solar system, scientists attached a small plaque to it, similar to one in the figure below. In case it should ever be found by an extraterrestrial civilization, scientists wanted to communicate some information about where the spacecraft came from.

Unfortunately, an extraterrestrial would probably not understand units such as meters or seconds. What kind of measurements would members of an extraterrestrial civilization understand? Eventually, scientists decided to use a type of energy given off by particles of hydrogen as the basis for a unit of length. A representation of hydrogen particles is labeled *A* on the plaque. The starburst pattern (labeled *B*) will help extraterrestrial scientists locate our solar system in the galaxy. The longest horizontal line represents the distance from our sun to the center of the galaxy. The shorter solid lines represent directions and distances from our sun to other stars.



1. Why didn't scientists use units of measurement on the *Pioneer* plaque that societies on Earth are familiar with?
2. Do you think it would be easier to communicate information about weight or mass to an extraterrestrial civilization? Explain. (*Hint: Consider which of these two measurements is constant.*)
3. At the bottom of the *Pioneer* plaque there is a diagram of our solar system (labeled *C*). What do you think the small drawing of the *Pioneer* spacecraft and the arrow coming from the third planet represent?