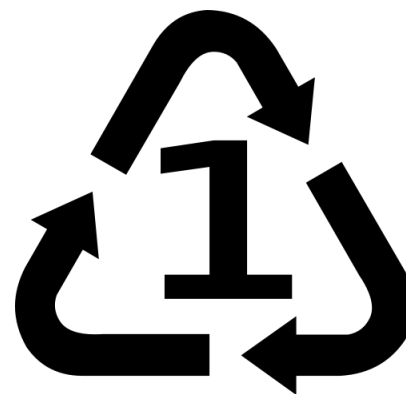


# Plastics By the Numbers

## Introduction

Plastics are made from long chains of polymers. The word “polymer” comes from the Greek *polys* (“many”) and *meros* (“parts”), meaning they are giant molecules made up of repeating units, called monomers. Many polymers are synthetic and produced in the lab, but many others are natural, like proteins, starches and even DNA. Polymers have a wide variety of properties like flexibility, color, and heat resistance. Chemists can modify these properties by controlling how the polymers form.



In this lab, you will identify the six main types of recyclable plastics and test their properties. You will perform several direct tests on each type of plastic. Also, several stations are set up throughout the laboratory for you to test how well the plastic floats and withstands heat. Finally, you will apply acetone to each sample to determine its reactivity.

## Materials

acetone  
plastic samples, types 1-6

salt

## Equipment

beakers, multiple  
hotplates, multiple

scissors  
well plate

## Safety Considerations

- Acetone will dissolve or soften some types of plastics; keep it away from eyeglasses, watches and cell phones.
- Sometimes chemicals from previous labs still remain in glassware and on other lab equipment; wash all lab equipment before and after performing this lab.
- Wash your hands thoroughly after completing this lab.

## Procedure

1. Using a pair of scissors, obtain 2-3 small squares of each type of plastic and place them in a well plate. Be sure to keep them separated so that you know the type of each piece of plastic.
2. Perform each of the following tests on one piece of each type of plastic and record your observations in the Data Table. If the piece is ruined by your test, discard it and obtain a new piece.
  - Try to bend or break the plastic.
  - Try to stretch the plastic.
  - Determine whether or not it floats in tap water.
  - Determine whether or not it floats in salt water.
  - Determine whether or not it floats in hot water.
  - Determine whether or not it deforms in hot water.
  - Test its reactivity with acetone (you may want to perform this test in a small beaker instead of the plastic well plate).
3. Using a stapler, attach a small piece of each kind of plastic to the Data Table.



**Questions**

1. Which type of plastic that you tested is the most durable? Which type of plastic that you tested is the least durable?

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2. Why is it so important to identify the type of plastic before attempting to recycle it?

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3. High-density polyethylene (HDPE) plastic, or #2, is the most commonly recycled plastic in the United States. Based on the tests you performed, why do you think this is the case?

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4. One of the major problems with recycling used plastic containers is separating them based on what they're made of. Based on your lab results, what process could you set up to separate a large mixture of PET (#1) and HDPE (#2) plastics?

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5. List one way you could change this lab and describe how your results might be different.

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