

● ○ ○ EASY



5 – 10 YRS



1 – 2 HRS



1

Learn about plastics and their recycling codes

2

Try an experiment to separate different plastic waste types

3

Find out how recycling plants recycle mixed plastic waste

INNOVATION IN CHEMISTRY

FANTASTIC PLASTIC RECYCLING



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INTRODUCTION

Most plastics are made by heating chemicals from crude oil.

Plastic is melted and poured into a mould and cools into a final shape. Plastics are useful because they are strong, cheap to produce, waterproof and light. Plastics however, are also polluting our planet because they take a long time to break down in the environment. To reduce the damage to our planet from plastic waste, we can recycle some plastics to use them again.

Look closely at plastic. Each has a triangle shaped recycling symbol with a number code inside, often with some letters. Each code refers to a different type of plastic. In recycling centres, these codes can help us to separate mixed loads of plastic so that each kind can be recycled correctly.



SAFETY

- **Always** ask an adult for help using scissors.
- Ovens should only be used by an adult.
- Hot materials should be allowed to fully cool before handling.
- This activity should be supervised at all times.



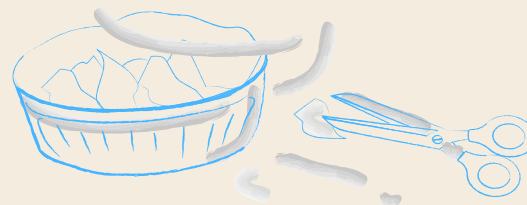
DID YOU KNOW?

The UK produces 100 billion items of plastic waste a year, with the average UK household throwing out 66 plastic items each week.

Reference: www.theguardian.com/environment/2022/jul/12/uk-dispose-of-100bn-plastic-packaging-year



ACTIVITIES



ACTIVITY 1: SEPARATING A MIXTURE OF PLASTIC ITEMS BY DENSITY

INSTRUCTIONS

1. Cut three strips the same size from each of the three plastic items. The strips must be small enough to fit into the bowl. Ask an adult for help using the scissors. You should have 9 strips altogether.
2. Using the marker pen, label each strip 'M' for milk bottle, 'Y' for the yoghurt pot and 'W' for the washing up bottle.
3. Put the 9 strips into a bowl half full of warm water and push them under the surface of the water with a teaspoon. The milk bottle strips will float.
4. Now add the salt to the bowl, one teaspoon at a time, and stir well after adding each teaspoonful until fully dissolved.
5. After you have added about 10 spoons of salt, the yoghurt pot strips will start to float.
6. The remaining strips, from the washing up liquid bottle, will remain sunk at the bottom of the bowl.
7. Can you work out which plastic type is least dense and will float most easily. What type of plastic do you think is the most dense and will sink to the bottom?



CHALLENGE: IS HDPE THERMOPLASTIC OR THERMOSETTING?

Plastics can be grouped into two main types. Thermosetting plastic cannot be easily melted once formed, so cannot be recycled. However, thermosoftening plastics become flexible when heated, so these are recyclable. Using a clean recycling **code 2** HDPE milk bottle, remove the label and cut the bottle into small pieces using scissors. Place a metal

cookie cutter on a baking tray covered with greaseproof paper and line the inside of the cutter with greaseproof paper. Place the pieces of milk bottle plastic inside the cookie cutter. Ask an adult to heat in the oven at 150°C (350°F) for 20 minutes and allow to cool for an hour before handling, make sure that the area is well ventilated. Is HDPE thermoplastic or thermosetting?

YOU WILL NEED

For Activity 1:

- Large bowl
- Teaspoons
- Scissors
- Marker pen
- Table salt

- A clean, empty plastic milk bottle (recycling code 2 HDPE)
- A clean, empty white plastic yoghurt pot or margarine tub (recycling code 5 PP)
- A clean, empty washing up bottle (recycling code 1 PET)

For Challenge:

- Metal cookie cutter
- Baking tray

- Greaseproof paper
- Code 2 HDPE milk bottle
- Scissors



WHAT'S HAPPENING?

Each different type of plastic has a different density. Density describes how heavy an object is compared to the size of the object. An item will float on liquids that have a higher density than the item.

For example, a feather will float on water as water is more dense than a feather. The milk bottle strips have a lower density than water, but the other plastics are more dense than water. Adding salt to the water makes the water heavier and more dense. The yoghurt pot will float to the surface because it has a lower density than the salty water. The washing up bottle has the greatest density so it stays at the bottom of the bowl even with salty water.