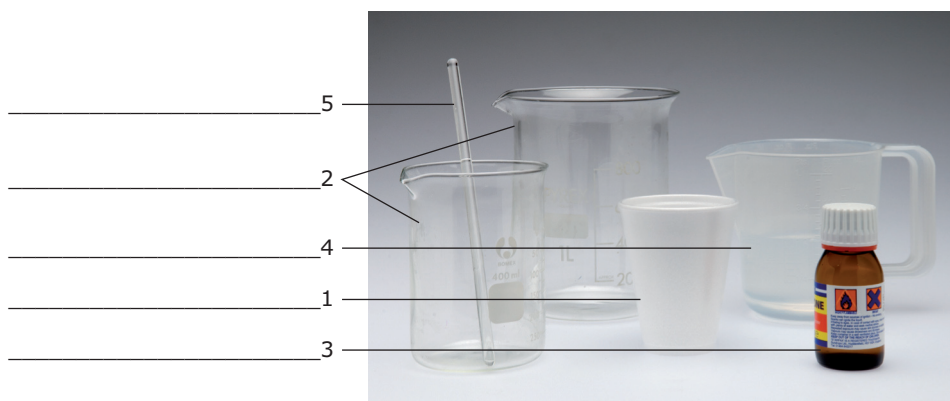


Exercise 1

Vocabulary: materials

Label the diagram with the materials you used for this experiment.

stirrer	water	glass beakers
polystyrene cup	acetone	



Exercise 2

Vocabulary: verbs

Complete the instructions for the experiment with the correct verb from the box.

place	wash	mould
fill	lift	
dissolve	remove	pour

- 1 First, \_\_\_\_\_ just enough acetone into one beaker to cover the bottom.
- 2 Then, \_\_\_\_\_ the other beaker three-quarters full with water.
- 3 Next, put your polystyrene cup in the acetone and watch it \_\_\_\_\_.  
Look out for the bubbles!
- 4 After that, use the spoon to \_\_\_\_\_ the dissolved polystyrene from the acetone and \_\_\_\_\_ it in the water.

- 5 Then, \_\_\_\_\_ your dissolved polystyrene well using the spoon, then your hands.
- 6 Finally, \_\_\_\_\_ it out of the water and \_\_\_\_\_ it into anything you want.

Look at your experiment sheet and check your answers.

### Exercise 3

### Conclusions: speaking, writing

What did you learn from this experiment? What happens when you put the polystyrene cup in the acetone? Talk with a partner then complete the sentences together.

Use the words in the box to help you.

dissolve

air

release

- 1 When we placed polystyrene cup in the acetone it ...

---

- 2 We think bubbles appeared because ...

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### Exercise 4

### A scientific report: writing

Now write a report on your experiment. Use the language provided to help you.

#### Useful Language box

*useful language for writing a scientific report*

1. *Say what you made*

*We made ...*

2. *Say how you made it*

*First we poured ...*

*Then we filled ...*

*Next we put ...*

*and watched ...*

*After that we removed ...*

*and placed ...*

*Then we washed ...*

*Finally, we lifted ...*



**How to make a solid change shape**  
Adrian Tennant**Learning objectives**

To explore the properties of everyday materials and how they can be changed.

**Content summary**

Pupils dissolve an expanded polystyrene cup and remould the material into something new. They learn that solids can change their shape, and that plastics are very useful materials which can be remoulded.

**Skills**

Reading, speaking, writing

**Grammar**

Past simple; present simple

**Vocabulary**

Nouns: *expanded polystyrene cup, acetone, beaker, bottom, three-quarters, bubbles, spoon,*

Adjectives: *boring*

Verbs: *take, turn into, pour, cover, fill, dissolve, look out for, remove, mould*

Connectors: *first, then, next, after that, finally*

**Time needed**

60–90 minutes

**Age group**

10–15

**Materials needed**

- Expanded polystyrene cup (or plate)
- 2 glass beakers
- 150–200 ml of acetone
- Water
- Stirrer
- Goggles

## Practicalities

Acetone is an irritant and should not be touched by the students. Use the spatula to remove the plastic and wash it in the water to remove most of the acetone before handling it. Goggles should be worn when working with acetone.

The longer the plastic is washed for the harder it becomes. After the plastic has been in the water for a few moments students can use their hands to squash it to remove more of the acetone, making the plastic more solid and easy to mould. Don't leave it for any longer than 5 minutes or it will become too hard to mould.

Plastic shapes can be left overnight to get really hard and then decorated with felt-tip pen before students take them home.

## Procedure

1. Tell pupils they are going to conduct a scientific experiment and learn how to make solid objects change shape! Show them the plastic cup and the acetone and ask them to guess what they think will happen when you put the plastic into the acetone. They can do this in their preferred language.
2. Introduce/pre-teach the core nouns and verbs that pupils will need: *expanded polystyrene cup, acetone, beaker, spoon, take, pour, cover, fill, dissolve, mould, stirrer, goggles.*
3. Point to the objects, demonstrate the verbs and drill pronunciation.
4. Hand out the experiment sheet and have pupils read out the instructions in class.
5. Ask them to work in groups and make observations while carrying out the experiment. You may need to give them a little time to think and talk about this. They can do this first in their own language but should then try to express what they observe in English. (They should use the past simple e.g. *When we placed the cup in the acetone it ...*)
6. They work in groups and follow the instructions on the experiment sheet. Monitor and help where required. Help them to say what they are doing in English.
7. Pupils try out their experiment. This will be noisy! Get them to record the result. They can make notes in English or in their own language.
8. Ask students to discuss in their groups these questions: What is the acetone doing? Why did bubbles appear as the polystyrene melted? They can discuss the answers first in their own language but should then try to express it in English. Monitor and help them explain in

English. Other questions you can ask are Why is plastic an important material? What things can we make from polystyrene? What was the polystyrene like before it was expanded with bubbles? How can you make the polystyrene set faster?

9. Hand out the worksheet and ask pupils to work their way through exercises 1, 2 and 3. They can check their answers with a partner. These exercises consolidate the vocabulary used in the experiment and get them to come to a conclusion about what happens when the card or paper tubes slide up and down.
10. Pupils then write up their findings in the form of a scientific report – encourage them to use the language in the useful language box. This exercise could be done for homework.

### Extra ideas to explore with your students

- How can you make the polystyrene set faster?
- Can you change the colour of your shape-shifting slime?
- Why would we choose to use expanded polystyrene to make disposable cups and plates instead of the plastic you have made? What would unexpanded polystyrene tableware look like?

Try adding measured quantities of modelling clay inside the mouse's nose cone and make a graph of weight and height/distance travelled.

### Links to everyday life

Polystyrene is now being used in parts of the world as diverse as Afghanistan, Alaska and the Dominican Republic as a strong and lightweight building material. This may help people to rebuild their towns after natural disasters or war. Not only is polystyrene a great insulator, it is also resistant to water, mould and mildew and able to withstand high winds, earthquakes and heavy snow.

A new recycling technique has been developed to help dispose of polystyrene. This technique uses limonene, a natural vegetable oil extracted from the skins of citrus fruits, which shrinks the expanded polystyrene to one 20th of its original size. This allows polystyrene to be recycled more efficiently.

**How to make a solid change shape**

Adrian tenant

**Exercise 1 – Vocabulary: Materials**

- 1 – points to the expanded polystyrene cup
- 2 – points to the 2 glass beakers
- 3 – points to the acetone
- 4 – points to the water
- 5 – points to the stirrer.

**Exercise 2 – Vocabulary: Verbs**

- 1 First, pour just enough acetone into one beaker to cover the bottom.
- 2 Then, fill the other beaker three-quarters full with water.
- 3 Next, put your expanded polystyrene cup in the acetone and watch it dissolve. Look out for the bubbles!
- 4 After that, use the spoon to remove the dissolved polystyrene from the acetone and place it in the water.
- 5 Then, wash your dissolved polystyrene well using the spoon, then your hands.
- 6 Finally, lift it out of the water and mould it into anything you want.

**Exercise 3 – Conclusions: Speaking, Writing**

- 1 When we placed expanded polystyrene cup in the acetone it dissolved.
- 2 We think bubbles appeared because air was being released/trapped air was released.