

6

From Raw Materials to Useful Products

Activity 1 Making bleach

Things you need:

- a large glass jar
- plastic cup
- dropper
- glass rod
- a battery
- blue ink
- 2 carbon rods
- concentrated salt solution
- two connecting wires with clips on each end

What does bleach do to colours?

Bleach removes the colour from a material or substance.

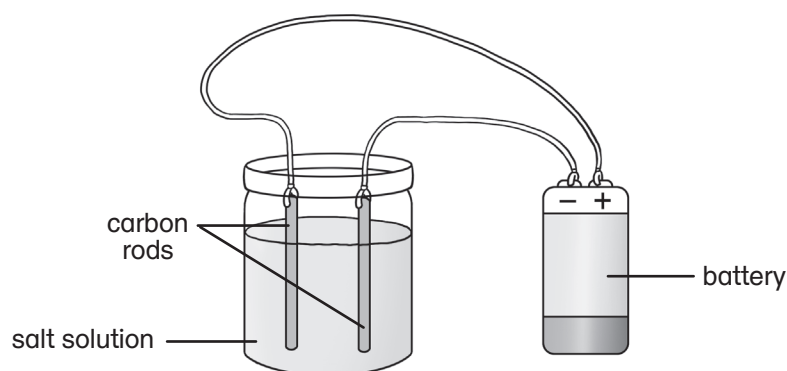
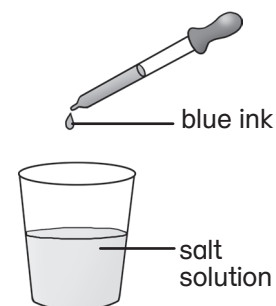
In this activity, you will use electricity to prepare a solution of bleach.

Procedure and observations

- Place some salt solution in a cup. Add a drop of blue ink.

Does the ink change colour? No

- Set up the apparatus as shown in the diagram below. Allow electricity to pass through the solution for a few minutes.



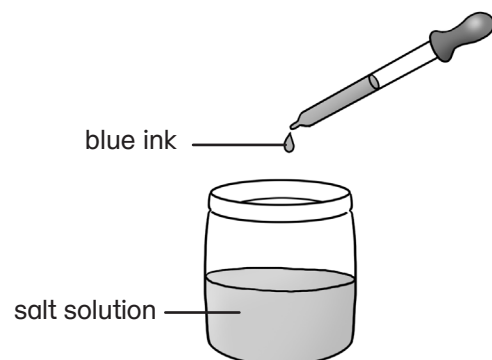
What do you observe around the two carbon rods?

Bubbles of gas.

- Switch off the electricity. Remove the carbon rods. Stir the solution in the beaker and then carefully smell it. What does it smell like?

E.g. Chlorine / Swimming pool water / Household bleach.

4. Add a drop of blue ink to the solution.



What happens to the ink?

The ink becomes colourless.

5. Is the solution in the jar a bleach? Explain.

Yes, as it has removed the colour from the ink.

Activity 2 Fermentation

Things you need:

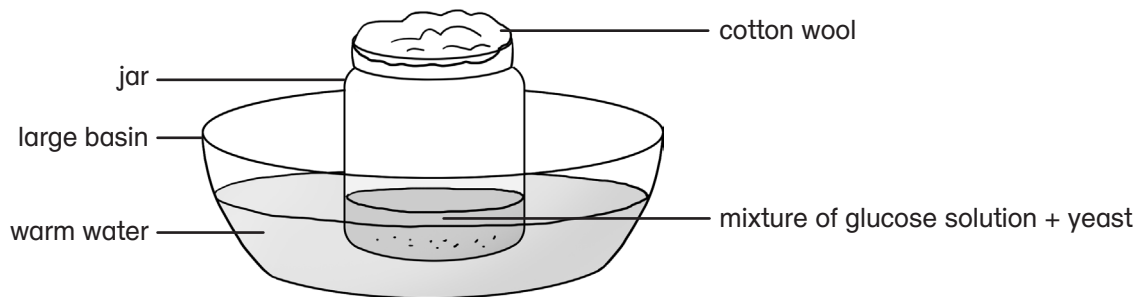
- glass or plastic jar
- spoon
- large basin
- cotton wool
- glucose solution (dilute ~10%)
- fresh baker's yeast
- warm water

Complete the sentence.

Fermentation is a chemical change that uses micro-organisms to change sugars into other substances.

In this activity, you will use yeast to change glucose (a sugar) into alcohol.

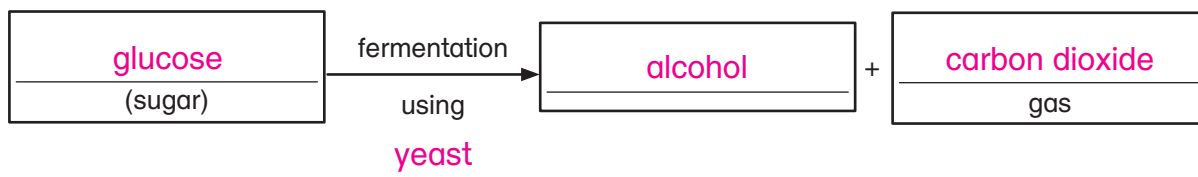
1. Set up the apparatus shown in the diagram. Place glucose solution in the jar. Then add 2 spoonfuls of yeast. Put some cotton wool in the top of the jar.



2. Place the jar in a large basin of warm water.
3. When you see bubbles of gas, fermentation is starting. (This may take about 10 minutes.)
Observe what happens in the jar.
4. After about 40 minutes, smell the mixture in the jar.
Does it have a smell? Yes

Questions

1. What is the name of the gas formed? Carbon dioxide.
2. What substance in the jar gives the smell? Alcohol.
3. Complete the diagram to show the changes that have happened?

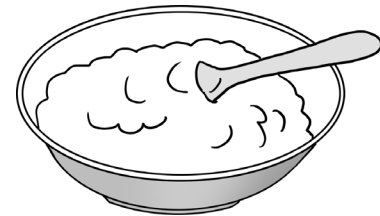


Activity 3 Making bread

Things you need:

- 1 cup warm water
- 3 cups flour
- sugar (1 tablespoon)
- salt (1 teaspoon)
- dry active yeast
- 1 large spoon
- 1 bowl
- 1 clean cloth

1. Dissolve the yeast in a little warm water and let it sit for 10 minutes.
2. In a bowl, put the yeast and water, sugar and salt.
3. Add half of the flour. Stir with a large spoon until well mixed. You have made the **dough**.
4. Stir in most of the remaining flour. The dough will be quite stiff but still sticky.
5. (a) Wash you hands.



Making the dough

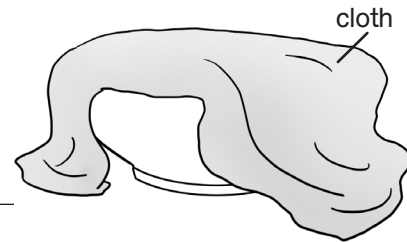
- (b) Put a little flour on top of the dough.
- (c) Use you hands to mix the dough for about 10 minutes. When the dough gets sticky, add a little flour. Stop when the dough is smooth and not sticky.



Mixing the dough

6. Cover the bowl with a clean cloth. Then leave the bowl in a warm place for about 90 minutes.
- (a) What happens to the size of the dough?

The size of the dough increases.



- (b) What process is taking place in the dough?

Fermentation.

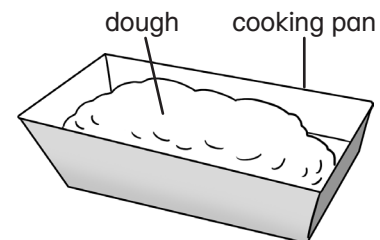
- (c) What gas causes the dough to 'rise'?

Carbon dioxide.

7. Baking the bread (optional)

To complete the bread making process, you will need a metal cooking pan and an oven.

- (a) Put the dough in a metal cooking pan. Put it in a warm place again for another 60 to 90 minutes. The dough will increase in size again.
- (b) Place the pan in an oven. Turn on the oven to about 200°C. Cook the bread for about 45 minutes. You will know it is done when the bread has a nice brown colour.



Activity 4 Making yoghurt

Things you need:

- 1 cup milk
- 1 teaspoon plain yoghurt
- 1 spoon
- 1 jar

Bacteria change milk into a soft solid we call yoghurt. The bacteria change lactose, a sugar in milk, into lactic acid. In this activity you will make some yoghurt.

1. Warm a cup of milk to about body temperature (about 37°C).
You can use a thermometer or your finger (the milk should be a little warmer than your finger.)
2. Add 1 teaspoon full of plain yoghurt and stir. (The plain yoghurt contains living bacteria.)
3. Pour the mixture into a clean jar.
Cover and put in a warm place for about six hours.
4. The mixture forms a solid. This is yoghurt.
When the yoghurt has set hard, it is ready to eat.



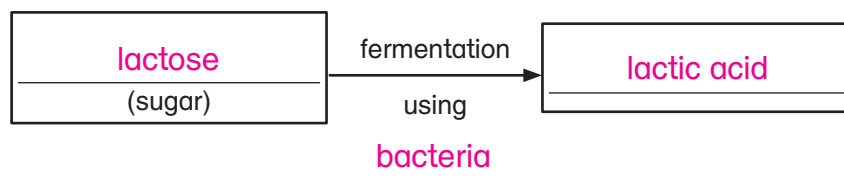
plain yoghurt

Questions

1. Bacteria change a sugar found in milk. What is the name of this sugar?

Lactose.

2. Complete the diagram to show the changes that have happened.



Activity 5 Comparing natural and man-made materials

Things you need:

- 1 dropper
- 1 dropper
- water
- 2 kinds of material used for clothing

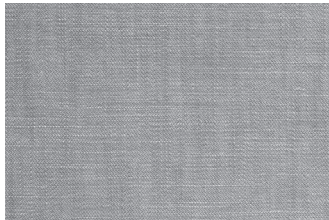
A The problem

For the cloths, use one natural material, such as cotton fabric, wool or silk, and one man-made material, such as polyester or nylon. The two cloths must be the same size and thickness.

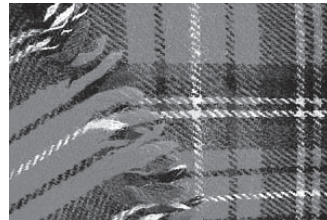
In hot weather, we perspire a lot. Clothing that absorbs perspiration is more comfortable to wear. You are to find which of two kinds of clothing material absorbs moisture better.

Procedure

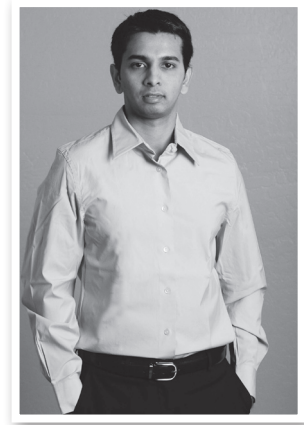
1. Your teacher will give you two pieces of clothing material. Both are the same size (area) and thickness.



Cloth A



Cloth B



2. (a) Add a drop of water to cloth A.
(b) Hold the cloth upright. Observe whether the water is absorbed or drips off the cloth.
(c) Continue adding water until no more can be absorbed, i.e. until water starts to drip off the cloth.
3. Repeat step 1 with the other cloth.



Results

Record your results in the table below.

Cloth	Number of drops of water absorbed
A	
B	

Questions

Your teacher will now tell you the materials used to make the cloths are made of.

1. (a) What materials are used?

Cloth A: E.g. Cotton Cloth B: E.g. Polyester/Nylon

(b) Which is a natural material and which is a man-made material?

Cotton is a natural material. Polyester/Nylon is a man-made material.

2. (a) Which cloth absorbs moisture better?

Cloth A (cotton).

(b) Clothing made from this cloth will be more comfortable to wear in hot weather. Explain why.

E.g. The cloth/cotton absorbs perspiration produced by the body making us feel drier and more comfortable.

3. In this activity, you carried out a fair test.

(a) State the **one** variable that was different in the tests.

The kind of cloth.

(b) List variables that were the **same** for the activity.

1. The size and shape of the cloths. 2. The temperature. 3. The size of the water drops.

B Additional activity (Optional)

Other comparisons of natural and man-made materials

Work in a group. Choose one of the following questions to answer.

- (1) Which clothing material is warmer?
- (2) Which clothing material dries quicker?
- (3) Which clothing material is easier to clean?

In your group, plan and carry out an experiment to answer the question.

Your method will be similar to the method in Part A above.

Record what you do in a notebook as follows:

1. **Purpose**

State the purpose of your investigation.

2. **Procedure**

Describe what you are going to do and the things you need. Remember to plan a fair test.

3. **Results**

Record your results. You might put them in a table as you did in Part A.

4. **Conclusion**

State the answer to the question you investigated.

This is a suitable activity for more able pupils and is a good preparation for junior high school. Let pupils choose the question themselves and provide them with the necessary materials. Note that the method for Question 1 is similar to Activity 2 in Unit 5.

Activity 6 Unit review

For Questions 1 to 3, refer to the following natural resources.

- (a) Air (b) Sea water
(c) Fossil fuels (d) Rocks

1. From which natural resource is petrol obtained? (c)
2. From which natural resource do we get salt? (b)
3. From which natural resource are metals obtained? (d)
4. What is chlorine in bleach solution used for?
I To make cotton clothes whiter
II To kill germs
III As a raw material for making salt
IV To make plastics
- (a) I only (b) I and II only
(c) II and (d) I, II, III and IV (b)
5. Cement is used as a building material. Which of the following raw materials are used to make it?
I Granite II Limestone
III Sand IV Clay
- (a) I and II only (b) I and III only
(c) II and III only (d) II and IV only (d)
6. What is the name of the process that changes sugar to alcohol?
(a) Fermentation (b) Food decay
(c) Decomposition (d) Burning (a)
7. Which of the following products can be made from plant oils?
I Plastics II Soaps
III Margarine IV Butter
- (a) I only (b) II and III only
(c) III and IV only (d) II, III and IV only (b)
8. Which of the following is a man-made material?
(a) Limestone (b) Iron
(c) Petrol (d) Polyester (d)

9. Which of the following is a *disadvantage* of polyester over other materials for making fabrics?

- (a) It is eaten by insects. (b) It is strong.
(c) It does not absorb perspiration. (d) It dries slowly when wet. (c)

10. Raw materials are changed into useful products by both physical changes and chemical changes.

(a) What is a physical change?

A change in which no new substance is formed.

(b) What is a chemical change?

A change in which a new substance is formed.

(c) State whether the following involve physical or chemical changes.

(i) Getting petrol from crude oil: Physical change.

(ii) Producing soap from plants oil: Chemical change.

(iii) Producing bleach solution from salt solution: Chemical change.

(iv) Using clay to make bricks: Physical change.

11. Crude oil is a mixture of substances. These substances are separated to give useful fuels.

(a) Where is crude oil separated?

In an oil refinery.

(b) What is the name of the process used?

Fractional distillation.

(c) Match the fuels obtained from crude oil to their uses.

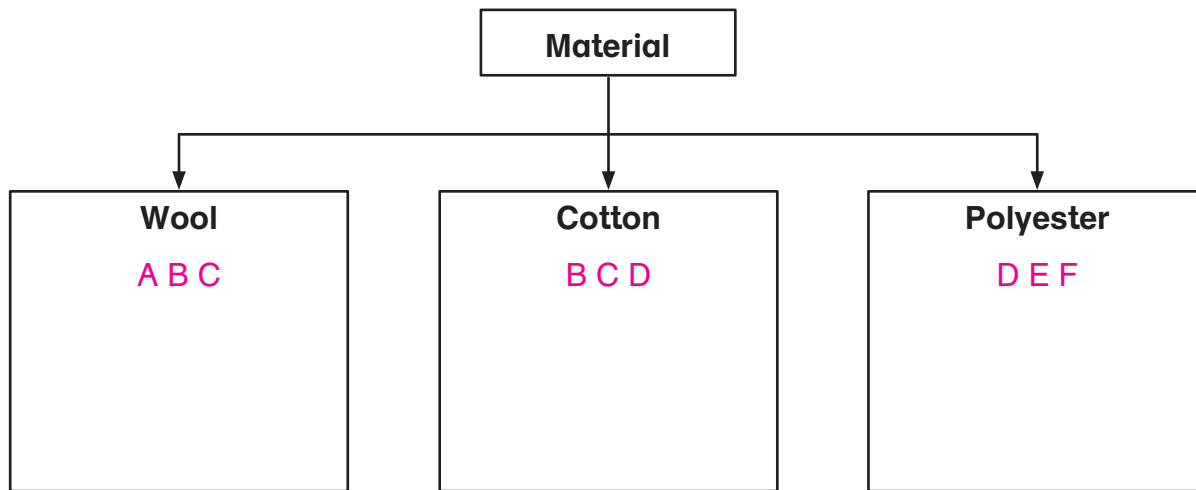
Fuel		Use
Petrol	●	Fuel for jet aircraft
Kerosene	●	Fuel for power stations
Diesel	●	Fuel for cars
Fuel oil	●	Fuel for trucks and buses

12. Complete the changes below for the raw material and the products made from them.

Raw materials	Products
(a) <u>salt</u> solution	bleach solution
(b) <u>limestone</u> + <u>clay</u> + water	cement
(c) fat + sodium hydroxide	<u>soap</u>
(d) plant oil + <u>hydrogen</u>	margarine
(e) sugar	<u>yeast</u> → <u>alcohol</u> + <u>carbon</u> <u>dioxide</u>

13. The following list gives desirable properties of fabrics. Sort them into three groups for wool, cotton and polyester. Some may be used more than once.

- A: Warm
- B: Absorbs perspiration
- C: Soft
- D: Good strength
- E: Does not rot
- F: Easy to wash and dry



14. Read the following sentences. Write 'T' for statements that are correct and 'F' for statements that are wrong.

(a) The change from raw materials to useful products always involves chemical changes.

F

(b) Bleach solution is useful because it can kill germs.

T

(c) Bacteria can be used to make foods.

T

(d) Naphtha is obtained from crude oil and is used to make plastics.

T

(e) Polyester fabric is good at absorbing perspiration.

F

(f) Granite rock is a raw material used to make cement.

F

Rewrite each *incorrect* statement in a suitable correct form.

E.g. (a) Both physical and chemical changes are used to change raw materials into
useful products.

(e) Fabrics made of natural materials absorb perspiration better than fabrics
made of synthetic/man-made materials.

(f) Limestone is a raw material used to make cement.

Activity 7 Mind map

Fill in the blanks in the mind map below. You may also add other information to the mind map from what you have learnt. Or, on a large sheet of paper, construct your own mind map using ideas in this module and from previous work.

