



Micro-organisms: Useful Microbes

A yeast racing competition is used to demonstrate to students that microbes can be beneficial.

Curriculum Links

Science
Working scientifically

PSHE/RSHE
Health and prevention

English
Reading and comprehension

Key Words

Culture, Fermentation, Probiotics

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[e-bug.eu/eng/KS2/lesson/
Useful-Microbes](https://e-bug.eu/eng/KS2/lesson/Useful-Microbes)

Learning Outcomes

All students will:

- Understand that some microbes can help keep us healthy.
- Understand that some microbes can be put to good use.
- Know that microbes grow at different rates depending on their environments.



Resources Required

Main Activity: Yeast races

Per student

- 2 plastic cups
- Flour
- Yeast solution
- Sugar
- 2 Graduated cylinders (or measuring jugs)
- Basin
- Hot water
- Teaspoon

Per student

- Copy of SH1
- Copy of SW1

Extension Activity: Fill in the Blanks

Per student

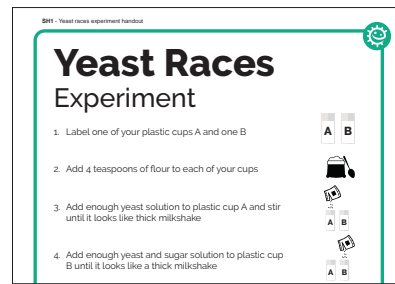
- Copy of SW2

Advance Preparation

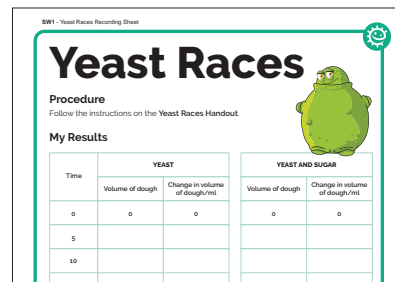
Purchase flour, sugar and dried yeast. Prior to starting the activity make up a liquid yeast solution as outlined on pack purchased. This may vary between different brands. If made too far in advance the yeast will start to ferment.

NB: do NOT add sugar until stated in the main activity.

Supporting Materials



SH1 Yeast Races Experiment Handout



SW1 Yeast Races Recording Sheet



SW2 Useful Microbes Fill in the Blanks Worksheet

Lesson Plan



Introduction

1. Begin the lesson by explaining that microbes can have both harmful and useful effects on our health. Ask the class what they know about useful or 'friendly' bacteria. Many students will have already heard about probiotic bacteria in yoghurt.
2. Explain that microbes are helpful in the breakdown of dead animals and plants, in helping animals and humans digest foods and in turning milk into yoghurt, cheese and butter.
3. Highlight that bread dough rises through the action of helpful fungus known as yeast. The yeast eats the sugars present in food and produces gas and acids. These acids change the taste, smell and form of the original foodstuff whereas the gas makes the dough rise.
4. Tell the class that in this activity they are going to see exactly how we can use useful microbes to make bread rise.

Discussion

Check for understanding by asking the class the following questions:

- a. What is the process which caused the yeast mixture to rise?
Yeast growing and using the sugars for energy; the yeast produces gas bubbles which cause the dough to rise.

- b. What would have happened if there were no live yeast in the mixture?
Nothing, it's the growing yeast that causes the breakdown of sugars and makes the dough rise.

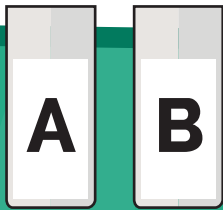
- c. Why was the mixture kept in a basin of warm water?
Most microbes prefer to grow at 37°C and will multiply faster if grown at this temperature. The faster the microbes grow the more breakdown of sugars will occur and the faster the yeast mixture will rise up the cylinder.

- d. What other food products are made using bacteria or fungi?
Cheese, bread, wine, beer, sour cream.

Start a classroom discussion on how microbes keep us healthy

≡ Main Activity: Test Races

1 Label 2 cups A and B. Add 4 teaspoons of flour to each cup



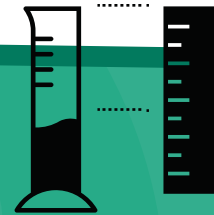
2 Add yeast to cup A and mix



3 Add yeast and sugar to cup B and mix



4 Pour each cup into cylinders and measure the height of the dough



Main Activity: Yeast Races

1. This activity is for groups of 2-5 students.
2. Highlight to the students that a useful fungus known as yeast is used to make bread. The yeast helps the bread rise through a process called fermentation.
3. Supply the class or groups with the Yeast Races Recipe (SH1).
4. Ask students to carry out the activity in their groups. When the recipe is complete, students should observe the yeast and record their observations on the student worksheet (SW1).
5. Can the class explain why the yeast and sugar solution moved faster than the yeast alone? Students should recognise that fermentation was carried out at a faster rate when the sugar was present.

Fascinating Fact

Elie Metchnikoff won the Nobel Prize in 1908 for his 'discovery' of probiotics. He was convinced that Bulgarian labourers lived longer than other people because of the microbes in the sour milk they drank. The microbes were later identified as *Lactobacillus bulgaricus*.



Extension Activity

Microbes and Food

Fill in the Blanks Worksheet

Provide students with SW2 and ask them to fill in the blanks using the correct words provided. This can be completed in the classroom or as a homework exercise.

SW2 Answers:

1. Fermentation
2. *Lactobacillus bulgaricus*
3. Yoghurt
4. Bread
5. Yeast
6. Air (CO₂)

Learning Consolidation

At the end of the lesson, ask the class the questions below to check understanding:

- Do microbes have both useful and harmful effects on our health.

Answer: Yes

- Some microbes can help keep us healthy True/False?

Answer: True

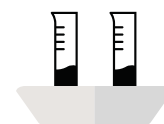
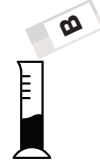
- Some microbes can be put to good use in the food industry. List five food or drink items.





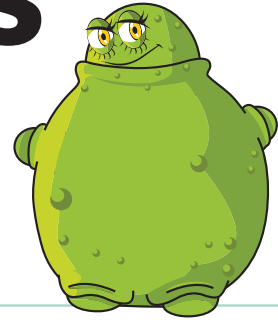
Yeast Races Experiment

1. Label one of your plastic cups A and one B
2. Add 4 teaspoons of flour to each of your cups
3. Add enough yeast solution to plastic cup A and stir until it looks like thick milkshake
4. Add enough yeast and sugar solution to plastic cup B until it looks like a thick milkshake
5. Pour the contents of cup A into graduated cylinder A until it reaches about 30ml
6. Pour the contents of cup B into graduated cylinder B until it reaches about 30ml
7. Record the exact height of the dough in each cylinder
8. Place both measuring cylinders into a basin of hot water
9. Measure the height of the dough every 5 minutes for 30 minutes





Yeast Races



Procedure

Follow the instructions on the Yeast Races Handout.

My Results

Time	YEAST	
	Volume of dough	Change in volume of dough/ml
0	0	0
5		
10		
15		
20		
25		
30		

YEAST AND SUGAR	
Volume of dough	Change in volume of dough/ml
0	0

My Conclusions

1. What caused the dough to rise up the container?

2. What is this process called?

3. Why did the dough in container B move faster than container A?

Did you know?
The average adult carries approximately 2kg of good microbes in their guts – the same weight as 2 bags of sugar.

Fascinating Fact
There are trillions of friendly bacteria in the average human gut.





Microbes

Microbes are single-celled organisms, most of which are useful, although some of them cause illness and disease. One of the main ways in which microbes are useful is in the food industry. Cheese, bread, yoghurt, chocolate, vinegar and alcohol are all produced through the growth of microbes. The microbes used to make these products cause a chemical change known as _____ a process by which the microbes break down the complex sugars into simple compounds like carbon dioxide and alcohol. Fermentation changes the product from one food to another.



Photo by Waldemar Brandt on Unsplash



Photo by Geoffroy Delobel on Unsplash

When the bacteria ***Streptococcus thermophilus*** or _____ are added to milk they consume the sugars during growth, turning the milk into yoghurt. So much acid is produced in fermented milk products that few potentially harmful microbes can survive there.

Lactobacillus is generally referred to as a good or 'friendly' bacterium. The friendly bacteria that help us digest food have been termed probiotic bacteria, literally meaning 'for life'. It is these bacteria that we find in _____ and probiotic drinks.

Yeast, ***Saccharomyces cerevisiae***, is used to make _____ and _____ products through fermentation. In order to multiply and grow, yeast needs the right environment, which includes moisture, food (in the form of sugar or starch) and a warm temperature (20° to 30°C is best). As the yeast ferments it gives off _____ which get trapped in the dough and the lump of dough expands.

Words to use: *Lactobacillus bulgaricus*, bread, air (CO₂), fermentation, yeast, yoghurt

