

P1. The conditions necessary for the growth of microbes

Pupils store uncooked and cooked rice under different conditions to determine the conditions needed for microorganisms to grow.

SAFETY NOTE: ONCE THE INVESTIGATION IS UNDERWAY, DO NOT ALLOW PUPILS TO OPEN THE TUBES. THE TUBES AND CONTENTS SHOULD BE DISPOSED OF BY AUTOCLAVING.

The following results can be expected:

	conditions in the tube	appearance after 1 week	appearance after 2 weeks
uncooked rice	no water, warm, air present	rice looks same	rice looks the same
cooked rice alone	water present, warm, air present	mould starting to grow	more mould present
cooked rice in refrigerator	water present, cold, air present	rice looks the same	rice looks the same
cooked rice with oil	water present, warm, layer of oil stops air reaching rice	rice looks the same	rice looks the same

You are advised to check the tubes periodically, and show them to the pupils when some mould has appeared in tube B. None of the other tubes should show this in the same period of time. The tubes can be left for longer if desired, in which case mould growth will occur in the other tubes except tube A. However, this may take a number of weeks.

The follow up discussion should reach the conclusion that water/moisture, warm temperature and air (oxygen from the air) are needed for the growth of microorganisms. Mould growth occurs because air containing mould spores has been able to get into the tubes.

The tubes and contents should be disposed of by autoclaving.

KS3
science and food technology

Timing - 15 minutes to set up the apparatus; the tubes then need to be looked at after approximately 1 and 2 weeks.

Pupil activity sheet P1 accompanies this activity.

Requirements

- test tubes or boiling tubes
- dry, uncooked rice
- cooked (boiled and drained) rice
- cotton wool
- access to a refrigerator (not where food for consumption is stored)
- marker pens or sticky labels

As soon as food is picked (harvested) or slaughtered it will begin to deteriorate as the microorganisms that cause food spoilage begin to attack.

What conditions do microbes need in order to make our food go 'off' or 'bad'?

Carry out the following experiment to be able to answer this question.

SAFETY NOTE
ONCE PREPARED: DO NOT REMOVE COTTON
WOOL BUNG FROM TUBES

Method

1. Label four tubes A - D.
2. Place some uncooked rice in tube A.
3. Place some cooked rice in tubes B, C and D.
4. Place enough cooking oil in tube D to just cover the rice.
5. Put a cotton wool bung in each tube.
6. Put tube C in a refrigerator.
7. Leave the other tubes at room temperature.
8. Look at the tubes after 1 week and 2 weeks.

Results

Look for the growth of mould in the tubes. Decide what the conditions were like in each tube during the experiment. Fill in the table below:

	conditions in the tube	appearance after 1 week	appearance after 2 weeks
uncooked rice			
cooked rice alone			
cooked rice in refrigerator			
cooked rice with oil			

What conditions are needed for microorganisms to grow?

If mould has grown in any of the tubes, where has the mould come from?