

ARTIS MICROPIA

Yeast

Airy fungi



Part 1

Question 1: What happened to the balloons? And do you see any difference between the two bottles?

Answer: The balloon on the bottle with the cross (containing sugar) has become much bigger than the balloon on the bottle without the cross (without sugar).

Question 2: What accounts for this difference?

Answer: Yeasts are single-celled fungi which eat sugars, and as a result they produce the gas carbon dioxide (CO₂). This carbon dioxide fills the balloons. But the yeast in the bottle without sugar has nothing to eat and therefore does not produce any carbon dioxide. As a result, the balloon inflates less, if at all.

Question 3: Why do bakers use yeast for making bread?

Answer: Yeast produces carbon dioxide, which makes the dough rise. So by using yeasts for making bread, the bread turns out nice and fluffy.

Part 2

Question 1: What does the yeast do with the sugar?

Answer: The yeasts convert the sugars into energy, in the process of which water and carbon dioxide (CO₂) are released. This requires the presence of oxygen.

Question 2: What effect does the airlock have?

Answer: The airlock seals the bottle, so that the grape juice cannot come into contact with the outside air. But gas from the juice can escape. This keeps pressure from building up inside the bottle, which is what would happen if a cork or a cap were used.

Question 3: What is the difference between the yeast's living environment in an open bottle as opposed to the bottle with the airlock?

Answer: The yeast in the closed bottle eventually runs out of oxygen, whereas the yeast in the open bottle continues to have oxygen available to it.

Question 4: In which bottle will wine be made? Why?

Answer: Over time, the environment in the bottle with the airlock will become oxygen deficient. The yeast will still be able to convert the sugar into energy, but it will have to do so without the use of oxygen. In the process, alcohol will be produced instead of carbon dioxide.

Part 3

Question 1: How can yeast use sucrose as a nutrient?

Answer: The yeast cells must first break the sucrose down into smaller sugar molecules. The yeast can absorb these and break them down further, in the course of which it can generate energy by producing NADPH and ATP.

Question 2: What are the differences between the tubes? What does this mean?

Answer: A colour gradient is developing: the contents of the first tube are still colourless, whereas the contents of the tubes further down are turning more and more yellowish-orange in colour. This colour develops because the Fehling's solution reacts to the quantity of sugar in the solution. The sucrose is gradually converted into glucose and fructose.

Question 3: Yeast breaks down sucrose into glucose and fructose. Look up the structural formula of sucrose and indicate the 'cleavage sites' of the yeast enzymes.

Answer: The structural formula of sucrose is shown below. The glucose ring (hexagonal with 1 CH₂OH group) is shown on the left and the fructose ring (pentagonal with two CH₂OH groups) is shown on the right. The cleavage site of the yeast enzymes is in the middle.

