

Production of CO₂ in Yeast

In this investigation you will culture (grow) yeast cells under almost ideal conditions. You will then study the structure of the cells, their nutrition, and reproduction.

Materials

test tube rack	oil (e.g. cooking oil)
test tubes (4)	compound microscope
microscope slide	10% aqueous solution of sugar
granular yeast	cover slip
iodine solution	medicine dropper
methylene blue stain	lens paper
paper towel	one-hole rubber stoppers (2)
glass elbows (2)	rubber tubing (2)
limewater	

Procedure

1. Fill two test tubes about two-thirds full with 10% sugar solution. Label one test tube “Control” and the other “Experimental.”
2. Add a pinch of granular yeast to the “Experimental” test tube. Shake the test tube to mix the yeast well with the sugar solution.
3. Examine a drop of the mixture from each test tube under low, medium, and high power. Note the structure of the cells.
4. Stain a fresh sample of the mixture from the “Experimental” test tube with iodine solution. Note any additional structures that you can see.
5. Repeat step 4 using methylene blue stain.
6. Connect each test tube to a CO₂ trap. The end of the rubber tubing should be covered by about 5 cm of limewater. Cover the limewater with a thin layer of oil to keep air away from the limewater.
7. Stand the test tubes in a test tube rack. Store them in a warm place, preferably at 25°C to 30°C. Note any changes that occur during the next two days. Record any changes in appearance and odour.
8. After two days, examine a drop of the mixture from the “Experimental” test tube under low, medium, and high power. Examine an unstained mount, a mount stained with iodine solution, and a mount stained with methylene blue. Note and sketch any changes that took place in the appearance of the yeast cells.

Discussion

1. What is the function of the “Control” test tube in this investigation?
2. a) Describe yeast cells as they appear in the unstained mount.
b) What structures were made visible by Lugol’s iodine stain?
c) What further structures were made visible by methylene blue stain?
3. a) Limewater turns cloudy in the presence of carbon dioxide gas. Excess carbon dioxide may turn it clear again. What do you conclude from the change that occurred in the limewater in this investigation?
b) What other evidence did you see to support your conclusion?

4. Describe the change in odour that occurred in this investigation. What product is responsible for this change? (Hint: You might have to read a little on “Anaerobic Respiration” in the text)
5. Describe and account for any changes that occurred in the appearance of the yeast cells after two days.