

Respiration in Yeast

Aim: To observe the process of respiration in yeast

Equipment:

- Dried yeast
- Sugar
- Spatula
- Boiling tube
- Balloons
- Warm water
- Camera (optional)

Safety Information



Glassware – risk of cuts if broken

Apply pressure to wounds and inform teacher immediately

Latex balloons – potential allergen

Check with students and offer alternative product

Method:

Step 1: Stretch the balloon out a few times so that the deflated balloon is flexible.

Step 2: Carefully add 1 spatula of dried yeast and 1 of sugar into the boiling tube.

Step 3: Fill the boiling tube, approximately $\frac{1}{4}$ to $\frac{1}{2}$ full with warm water.

Step 4: Stir gently with spatula for 5 to 10 seconds. Take care not to knock the sides of the boiling tube and break the glass.

Step 5: With a partner's help, stretch the neck of the balloon over the mouth of the boiling tube.

Step 6: The yeast mixture will begin to froth. Stand the boiling tube into a rack and observe.

(Optional) Step 7: You may want to take a photograph of the balloon every minute or so as a means of recording your observations.



Questions

1. What happens to the balloon during the reaction? Explain your answer.
2. Name the gas that is being produced.
3. Are the yeast cells respiring aerobically or anaerobically? Explain your answer.
4. Write the word equation for the anaerobic respiration (fermentation) of yeast.
5. Name two products in which yeast is used as an ingredient.
6. Explain how the yeast acts as a raising agent when making bread.

Extra Challenge

Write a plan for an investigation to find the optimum temperature of respiration in yeast. You will need to justify your equipment choices and explain how your method is valid.

Answers

1. What happens to the balloon during the reaction? Explain your answer.

**The balloon inflates as it fills with the gas produced during the reaction.
As the gas cannot escape, it fills and expands the balloon.**

2. Name the gas that is being produced.

Carbon dioxide

3. Are the yeast cells respiring aerobically or anaerobically? Explain your answer.

Initially the yeast cells are respiring aerobically because of the oxygen present in the air in the boiling tube. However, as the tube is sealed and no more air can enter, once this oxygen has been used up, the yeast cells will carry out anaerobic respiration.

4. Write the word equation for the anaerobic respiration (fermentation) of yeast.

glucose → carbon dioxide + ethanol + [energy]

5. Name two products in which yeast is used as an ingredient.

Bread, beer, wine, pizza dough

6. Explain how the yeast acts as a raising agent when making bread.

The respiration of yeast during the baking process produces carbon dioxide gas. The gas builds up as bubbles inside the bread dough, forming air pockets, which make the dough expand and rise.

Extra Challenge

Write a plan for an investigation to find the optimum temperature of respiration in yeast. You will need to justify your equipment choices and explain how your method is valid.

Equipment and accuracy:

- Students should be describing how to collect quantitative data through the use of a thermometer and a range of appropriate temperatures (e.g. 20°C to 80°C in 10°C increments).
- Students should be choosing to use a balance to measure the mass of yeast / sugar, rather than by 'spoonful'.
- Students should be choosing to use a suitable measuring cylinder / syringe to measure the volume of water.

Planning a valid investigation

- Students should ensure that they have described methods for maintaining all other variables (other than temperature of water).

e.g: amount of yeast, amount of sugar, size and type of balloon, time taken for reaction, container for reaction.