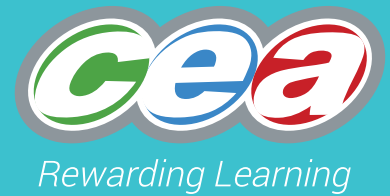


GCSE



CCEA GCSE TEACHER GUIDANCE

# Biology Practical Manual

## Unit 3: Practical Skills

### 1.5 Investigate the factors affecting yeast respiration

For first teaching from September 2017





## Practical 1.5

### Investigate the factors affecting yeast respiration

**Introduction:** As a live organism yeast needs certain factors to be at their optimum in order for it to survive and reproduce. In addition the yeast will carry out many biochemical reactions such as respiration which will be affected by factors affecting any enzyme reaction. The factors affecting respiration in yeast are:

- temperature
- pH
- nutrient availability
- build up of waste materials

There are many experiments that can be done to investigate the impact of these factors on yeast respiration. The experiment chosen below will investigate the effect of temperature on yeast respiration.

Respiration in yeast can be aerobic and anaerobic. In both cases carbon dioxide is produced as a waste product. By collecting the carbon dioxide produced in a given time we can determine the respiration rate. If we set up identical experiments in five water-baths set at 10°C intervals, it is possible to show how temperature affects this rate.

#### **Hypothesis:**

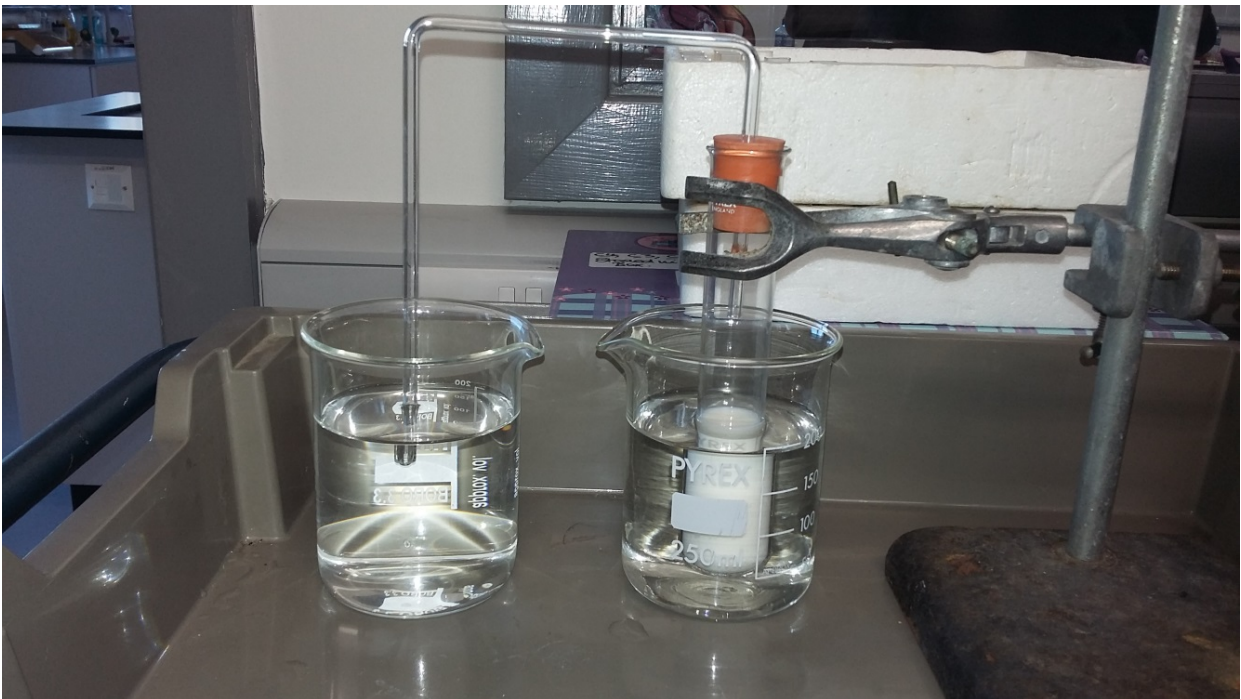
The higher the temperature, the more carbon dioxide will be released by yeast, therefore forming a greater amount of bubbles. Once the temperature gets above a certain point the rate of respiration will decrease.

### Apparatus:

- boiling tubes with bungs
- 2% sucrose solution
- activated yeast suspension
- glass delivery tube
- thermostatic water-baths

### Risk Assessment:

- By using a kettle to fill initial water-bath the risk of burning using the Bunsen burner is removed.
- The water-bath will contain water at 70°C initially, so there is a risk of scalding from the water. Utmost care should be taken.
- Yeast will not be handled directly pupils, minimising allergy risk.
- Any splashes from yeast will be immediately rinsed off.



**Method:**

1. Gather all of the apparatus as listed and set up as shown in photograph above.
2. Pour 300ml of hot water from the kettle (start at 70°C) into a 500cm<sup>3</sup> beaker.
3. Use a thermometer to measure the temperature of water.
4. Pour 10ml of yeast and 20ml of 5% glucose solution into a boiling tube using separate syringes.
5. Suspend the test tube in the water bath, covering it with a bung and then connect delivery tube.
6. At the other end of the delivery tube, place another 500cm<sup>3</sup> beaker filled with tap water where the carbon dioxide bubbles will be seen as the product.
7. Allow respiration to occur for 2 minutes before starting step 8.
8. Using a timer, record the number of bubbles you see for 1 minute.
9. Repeat steps 2-8 but with 60, 50, 40, 30 and 20 degrees.
10. Record your results in the table below.

**Results:**

Complete the table of results below and then draw a graph of the results

Temperature/°C	CO <sub>2</sub> bubbles produced/min
20	
30	
40	
50	
60	
70	

**Conclusion**

As the temperature increased to 40°C, the rate of respiration of the yeast increased. Above 50°C the rate of respiration then decreases.