**An investigation of the effect of temperature on respiration in yeast**

Yeast is a single-celled fungus. It can respire aerobically and anaerobically. During aerobic respiration, the transport of electrons is linked to the synthesis of ATP. In this investigation these electrons will be accepted by a substance called methylene blue. When methylene blue accepts electrons, it changes from blue to colourless.

**Learning objectives**

* To develop practical skills a, b, c and i
* Demonstrate competencies 2a; 2b; 2c; 2d and 4b.
* To demonstrate the effect of temperature on respiration rates in yeast

**Method**

You are provided with the following:

* yeast and glucose mixture
* methylene blue
* test tubes
* test-tube rack
* beaker to act as water bath
* a way of changing the temperature of the water bath
* graduated pipettes or syringes
* marker pen
* thermometer
* timer.

You should read these instructions carefully before you start your investigation.

1. Use the beaker to set up a water bath at 35 °C.
2. Label three test tubes 1 to 3.
3. Shake the yeast and glucose mixture.
4. Add 2 cm3 of the yeast and glucose mixture to all five tubes.
5. Place all three tubes in the water bath and leave them until the contents reach 35 °C. Make sure the water bath stays at 35 °C
6. Add 2 cm3 methylene blue to test tube 1.
7. Immediately shake this tube for 10 seconds and replace the tube in the water bath. Note the time and do not shake this tube again.
8. Record how long it takes for the blue colour to disappear in the tube.
9. Repeat steps 6 to 8 for the other two tubes.
10. Think about which other temperatures to use. Repeat steps 1 to 9 at each temperature.

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|  | Apparatus and techniques |
| AT a | use appropriate apparatus to record a range of quantitative measurements (to include mass, time, volume, temperature, length and pH) |
| AT b | use appropriate instrumentation to record quantitative measurements, such as a colorimeter or potometer |
| AT c | use laboratory glassware apparatus for a variety of experimental techniques to include serial dilutions |
| AT i | use microbiological aseptic techniques, including the use of agar plates and broth |
| 2. Applies investigative approaches and methods when using instruments and equipment | a. Correctly uses appropriate instrumentation, apparatus and materials (including ICT) to carry out investigative activities, experimental techniques and procedures with minimal assistance or prompting. b. Carries out techniques or procedures methodically, in sequence and in combination, identifying practical issues and making adjustments when necessary. c. Identifies and controls significant quantitative variables where applicable, and plans approaches to take account of variables that cannot readily be controlled. d. Selects appropriate equipment and measurement strategies in order to ensure suitably accurate results.  |
| 4. Makes and records observations | b. Obtains accurate, precise and sufficient data for experimental and investigative procedures and records this methodically using appropriate units and conventions.  |