

In this experiment we are going to investigate the respiration rate in yeast using a reduction of resazurin.

For this experiment we will need:

A rack with three boiling tubes marked A, B and C.

Distilled water.

5% glucose solution.

Resazurin dye.

Live immobilised yeast beads.

Immobilised yeast beads that have been made using boiled yeast.

A Pasteur pipette, or syringes.

A water bath, set to 35 degrees Celsius and a timer.

Resazurin dye is used in this experiment as an indicator of respiration, and the time taken for resazurin to change colour will indicate the rate of respiration.

The dye should change colour as indicated from left to right in the chart as respiration takes place.

Let's start the experiment:

First, add 3 cubic centimetres of resazurin dye to each boiling tube.

Then 3 cubic centimetres of glucose solution to tubes A and C.

After cleaning the syringe add 3 cubic centimetres of water to tube B.

Add 15 beads of live yeast to tubes A and B.

Then add 15 beads of boiled yeast to tube C.

After sealing the tubes, gently shake each one and place in a water bath at 35 degrees Celsius.

We will monitor and record the colour of each tube every three minutes for thirty minutes by comparing the tubes against a colour chart.

The chart shows the colour change we might expect as blue resazurin dye is reduced.

From left to right, it starts as blue, which means it is oxidized.

It carries on through lilac and mauve, which means it is partially reduced and then through pink until it becomes colourless, which means it is completely reduced.

The numerical values can be related to respiratory or dehydrogenase activity in yeast with 10 being equivalent to lowest activity, and 1 being highest activity.

After 30 minutes we can see that Tube A, with live yeast and glucose, shows the most colour change as the resazurin dye has been reduced due to respiration.

The colour change started after 3 minutes and continued as the resazurin dye was reduced due to respiration.

The final colour in Tube A is Number 2 showing that respiration has occurred.

Tube B, with no glucose and live yeast, shows no colour change.

No respiration has taken place as there has been no sugar for the yeast to use in respiration.

Tube C, with dead yeast and glucose, also shows no colour change, indicating no respiration has occurred.

There is no living organism as the yeast is dead, so respiration does not occur.

This experiment shows that:

Live yeast respires in the presence of glucose and that resazurin dye changing colour was an indicator of respiration.

To compare respiration rates we could change variables such as respiratory substrate, temperature, and type of yeast.