
GCSE Biology required practical activity 10: Decay (biology only)

Student sheet

Required practical activity	Apparatus and techniques
Investigate the effect of temperature on the rate of decay of fresh milk by measuring pH change.	AT 1, AT 3, AT 4, AT 5

Investigating the effect of temperature on the rate of decay of fresh milk by measuring pH change

In this experiment you will use an alkaline solution of milk. When lipase is added the fat in the milk is broken down into fatty acids. This makes the pH of the solution lower.

Phenolphthalein is an indicator that is pink in alkaline solutions of about pH 10. When the pH drops below pH 8.3 phenolphthalein becomes colourless.

Learning Outcomes
1
2
Teachers to add these with particular reference to working scientifically

Method

You are provided with the following:

- a small beaker containing milk
- a small beaker containing sodium carbonate solution
- a small beaker containing lipase solution
- 250 cm³ beakers, to be used as water baths
- test tubes
- a test tube rack
- a marker pen
- 10 cm³ plastic syringes
- a stirring thermometer
- a stop clock / stopwatch

- phenolphthalein in a dropper bottle
- an electric kettle, for heating water
- ice, for investigating temperatures below room temperature.

You should read these instructions carefully before you start work.

1. Set up a water bath by half filling one of the 250 cm³ beakers with hot water from the kettle.
2. Label two test tubes: one 'lipase' and the other 'milk'.
3. In the first test tube put 5 cm³ of lipase solution.
4. In the other test tube put five drops of phenolphthalein solution.
5. Use a calibrated dropping pipette to add 5 cm³ of milk to the tube containing the phenolphthalein.
6. Use another pipette to add 7 cm³ of sodium carbonate solution to this test tube. The solution should be pink.
7. Put a thermometer into this test tube.
8. Put both test tubes into the water bath and wait until the contents reach the same temperature as the water bath.
9. Use another dropping pipette to transfer 1 cm³ of lipase into the tube containing the milk and phenolphthalein. Immediately start timing.
10. Stir the contents of the test tube until the solution loses its pink colour.
11. Record the time taken for the pink colour to disappear.
12. Repeat the above steps for different temperatures of water bath. You can obtain temperatures below room temperature by using ice in the beaker instead of hot water.
13. Record your results in a table such as the one here and plot a graph of your results.

Temperature of milk in °C	Time taken for pink colour to disappear in seconds			
	Trial 1	Trial 2	Trial 3	Mean