

Investigation into factors affecting decomposition

Introduction

Decomposers secrete enzymes into the soil to break down waste. In this investigation the enzyme urease catalyses the breakdown of urea into ammonia. The ammonia dissolves in water to create an alkaline solution. The rate at which the solution becomes alkaline is affected by the temperature. During this reaction the red acidic solution changes to an alkaline blue.

Apparatus

10 × boiling tubes
 test tube rack
 labels
 3 × syringes
 dropping pipette
 pH colour chart
 1.5% urease solution
 1.25% ethanoic acid
 universal indicator in a dropper bottle
 1% urea solution
 stopwatch

Method

1. Label a test tube as 20 °C.
2. Use a syringe to add 2.5 cm³ of urea to the test tube.
3. Add 1 cm³ of ethanoic acid and 10 drops of universal indicator to the test tube.
4. Add 10 cm³ of urease to another test tube and place both tubes into a 20 °C water bath.
5. Pour the urease into the tube labelled 20 °C.
6. Start the stopwatch and record the time taken to turn from red to blue.
7. Repeat steps 1-6 for temperatures of 30, 40, 50 and 60 °C.

Analysis

1. Plot a graph of temperature against the time taken to change colour.