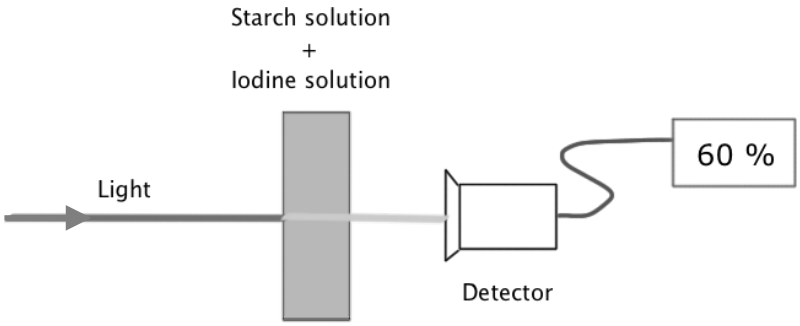
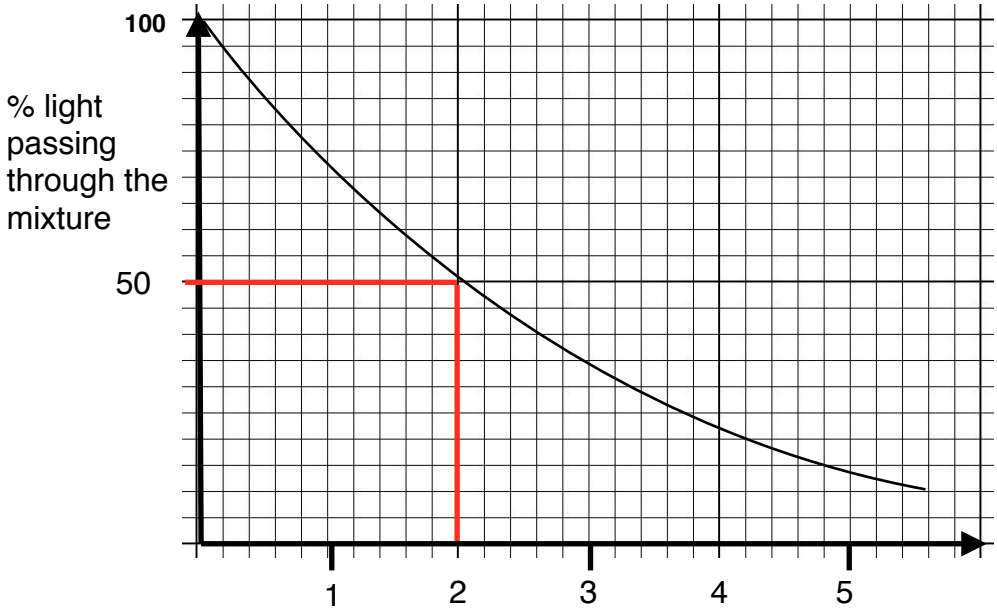
1 A company that makes slimming foods is experimenting with carbohydrase enzymes made by different microbes.

They use iodine solution which is pale brown. When iodine reacts with starch, it produces a dark blue mixture.

Known concentrations of starch solution and iodine solution are placed into a colorimeter which measures the percentage of light passing through the mixture, as shown in the diagram below.





(a) Explain why more light passes through when the starch solution is dilute.

More transparent/less opaque/mixture is lighter in colour [1 mark]

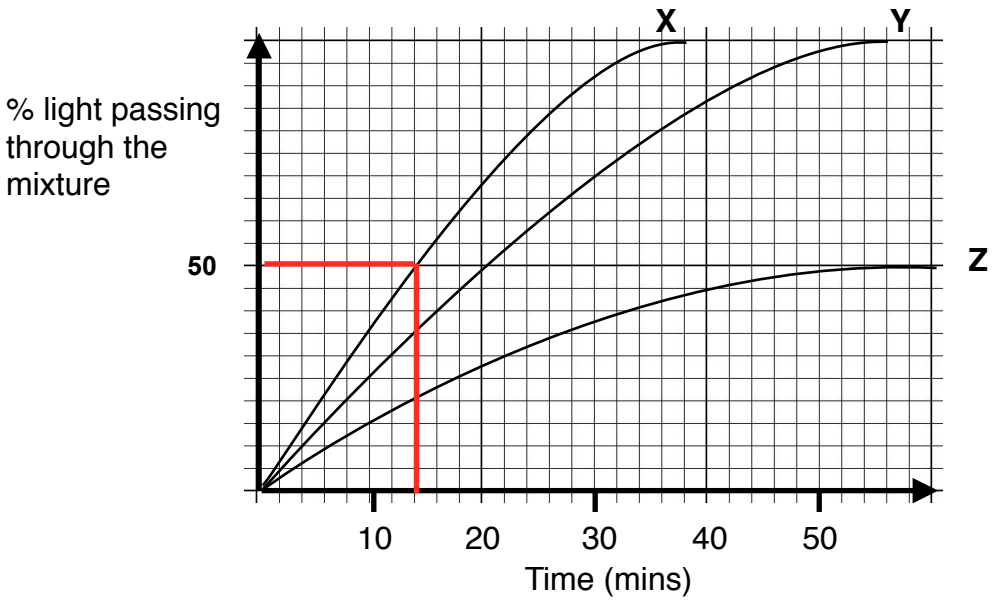
Not 'thicker'

(1 mark)

The investigators from the company add carbohydrase from each of three different microbes, **X**, **Y** and **Z**, to starch in flasks at 35 °C.

Every 2 minutes some of the mixture is added to iodine solution and placed in the colorimeter.

The graph below shows the results.



1 (b) Use **both** graphs to answer the following question.

How long does it take for the most effective carbohydrase enzyme to reach a 2% concentration of starch.

14 minutes [2 marks].

See the graphs for how this is calculated. The first graph is used to see what percentage of light passes when there is a 2% concentration of starch, then the second graph can be used to see how much time passes before 50% is reached for each curve. We are interested in the quickest one, which is graph X, which equates to 14 minutes.

(2 marks)

1 (c) Carbohydrase enzymes break down starch to glucose. Glucose can be converted to fructose in the final stages of making slimming foods.
Why is it better to use fructose rather than glucose in slimming foods?

Fructose is sweeter than glucose [1 mark]

Needed in smaller quantities or less is needed [1 mark]

A lot of reading for just five marks, but there are often questions like this where you have to apply a science methodology.

(2 marks)