# Topic 6 – Practical 4

## *Modelling digestion and absorption using Visking* *tubing*

### Safety

• Iodine solution is a low hazard. Wear eye protection. May stain skin or clothing if spilled; rinse off the skin if spilled.

• 1% amylase is an irritant. Wear eye protection.

### Apparatus and materials

For part 1:

• 10 cm length of Visking (dialysis) tubing • test tubes

• 10 cm3 syringe • test tube rack

• 10% glucose solution • spotting tile

• 1% starch suspension • dropping pipettes

• thread to tie the tubing • iodine solution

• boiling tube • 250 cm3 beaker

• rubber band or sticky tape • boiling water

• distilled water • Benedict’s reagent

• stopwatch

For part 2:

• 5% starch suspension

• 1% amylase

### Introduction

Visking (or dialysis) tubing is a made of a semi-permeable material that allows the passage of small but not large molecules. Diffusion is the movement of molecules from an area of high concentration to one of lower concentration, and it occurs across a semi-permeable membrane as long as the molecules are small enough to pass through it unhindered. In Part 1 of this experiment you can investigate these concepts and in Part 2 you can study how Visking tubing is used as a biological model to represent the gut.

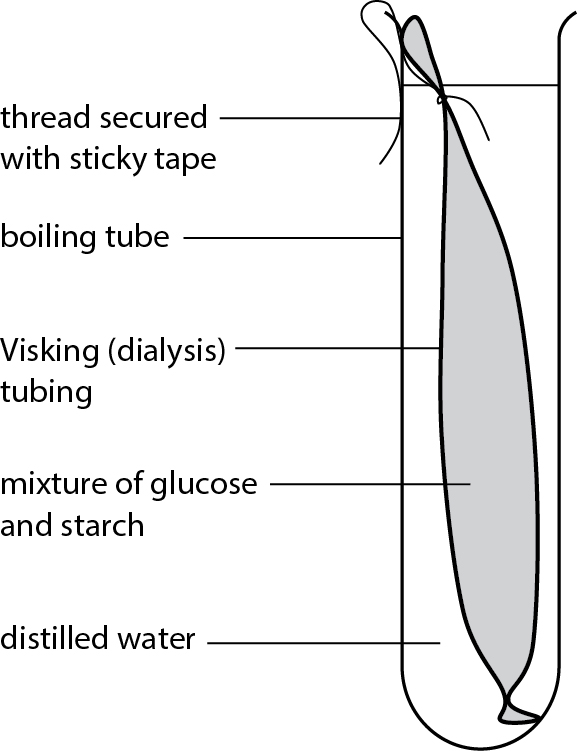
### Procedure

**Part 1**

**1** Soak the Visking tubing in water to soften it and knot or tightly tie one end with thread.

**2** Use a syringe to put 3 cm3 glucose solution and 3 cm3 starch suspension into the Visking tubing. Seal the upper end with thread as shown.

**3** Suspend the tubing in a boiling tube using the thread, which can be fixed in position using sticky tape or an elastic band. Fill the boiling tube with distilled water.



**4** Start the stopwatch.

**5** Test the distilled water for starch by pipetting a small amount of water into a spotting tile and adding a drop of iodine solution.

**6** Test the distilled water for glucose (reducing sugar) using the Benedict’s test. (To do this, take approximately 1 cm3 water, and mix with an equal volume of Benedict’s reagent in a test tube. Place the test tube in a water bath, e.g. a beaker of boiling water, for 2 or 3 minutes. A positive reaction is indicated by a green–brown colour.)

**7** Leave the apparatus for 10 minutes and repeat the starch and glucose tests on the distilled water.

**Part 2**

**1** Repeat the procedure above but this time use a syringe to add 3 cm3 starch suspension and 3 cm3 amylase to the Visking tubing. (If you are using the same tubing, make sure it is thoroughly rinsed before it is refilled.)

**2** At 2 minute intervals, test the distilled water in the boiling tube for the presence of starch and glucose (reducing sugar).

**3** Summarise your conclusions and evaluate your procedure.

### Questions and further work

**1** Visking tubing is used as a model of the gut. In what way is it similar to and different from the real gut?

**2** How could the action of amylase on starch solution be speeded up? How could it be slowed down?