
Frank's simplex potometer

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Class sets of potometers are often needed so that pupils can measure the uptake of water by plants under different conditions. The problems with commercially-available designs are their cost (£6 to £80+) and the difficulties in avoiding trapping air in the system.

This note describes a simple, cheap, but effective

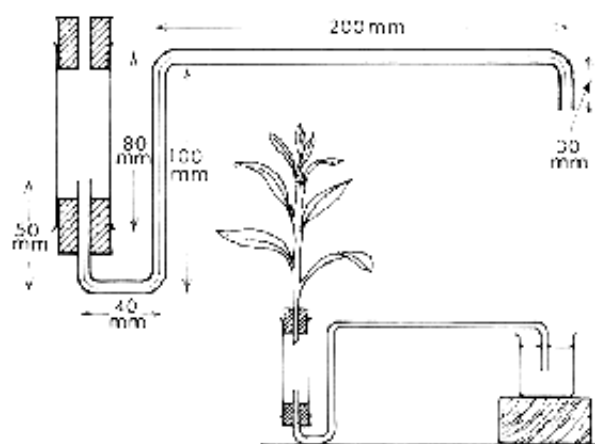


Figure 1 Potometer dimensions

five potometer which has been used most successfully by pupils up to GCSE level.

DESIGN

The potometer, shown in Figure 1, consists of a vertical tube with a bent capillary tube emerging from the lower end. The shaping of the capillary tube into a 'U-bend' is the key feature in this design; the U-bend makes the potometer easy to assemble and fill, and reduces the chances of air being trapped in the system. In fact, after several years' use of this design, we have found it most unusual to have any problems with entrapped air; any air in the capillary tube is forced out when the bung holding the plant shoot is inserted.

MANUFACTURE

The 'body' of the potometer is made from a 24 mm borosilicate thin-walled test tube. This is cut to length (80 mm) and the sharp ends flamed to smoothness. The capillary tube is then bent to the shape shown in Figure 1. Finally, one rubber bung is bored to give a snug fit to the capillary tube and the other is bored with a hole of about 8 mm diameter to accept the plant stem.

The total cost is in the region of £1.50, and the construction can be undertaken using a Bunsen burner by anyone with rudimentary glass-blowing expertise.

USE

To use the potometer, a good sized woody-stemmed shoot with a stem-diameter of 9-10 mm is needed. (We have found willow herb to be ideal for this purpose.) This is inserted into the bung using cork-borers to expand the diameter of the hole, thus ensuring a tight fit without damaging the plant stem. It should not be necessary to use Vaseline or grease to prevent leaks.

The potometer body (ie the test tube) should then be held in a vertical position and the open end of the capillary tube immersed in a small beaker of water. Next, the potometer body is filled to the brim with water and the bung (complete with shoot) needs to be slowly and carefully fitted. This will drive any air out of the system, but the end of the capillary tube should be kept in the beaker of water until the potometer is ready for use.

If quantitative work is to be carried out, graph paper, a rule, or markings on the capillary tube will also be needed.

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