

**A Level Biology A**  
**H420/01 Biological Processes**

**Question Set 12**

12 (a)

A student carried out an investigation into the effect of ethanol on the permeability of cell membranes in beetroot.

The student's method comprised the following five steps:

1. Cut equal sized pieces of beetroot using a cork borer.
2. Wash the pieces in running water.
3. Place the pieces in 100cm<sup>3</sup> of different concentrations of ethanol.
4. After 5 minutes, remove samples from each of the ethanol solutions.
5. Place each of the samples into a colorimeter to collect quantitative data.

(i) Each step in the student's method relies on certain assumptions.

For each assumption listed below, select the **numbered step** from the student's method that relies upon that assumption.

*Assumption A*

Pigment will only leak into the solution if membranes are disrupted.

*Assumption A relates to step*  
.....**3**.....

*Assumption B*

Absorbance is proportional to concentration of pigment.

*Assumption B relates to step* .....**5**.....

*Assumption C*

Pigment will be released when the beetroot is sliced.

*Assumption C relates to step* .....**2**.....

[3]

(ii) The student kept the ethanol solutions at a constant temperature. State **two other** variables which need to be controlled in this investigation to ensure the data collected are valid.

1 ...**Surface area of beetroot pieces**.....

2 ...**pH**.....

[2]

(b) (i) Fig. 20.1 shows the graph plotted by the student.

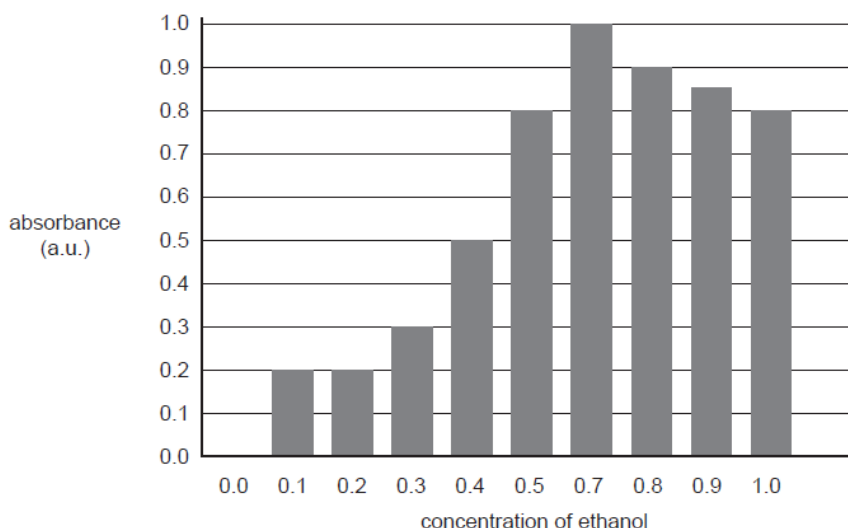


Fig. 20.1

Make **three** criticisms of the way the student has displayed these results.

1. **Concentration of ethanol has no units.**.....
2. **Continuous data so should be a line graph rather than a bar chart.**.....
3. **Incorrect scale on x-axis, 0.6 is missing**.....

[3]

(b) (ii) Explain how carrying out replicates would improve this investigation.

**Carrying out replicates improves the repeatability of measurements. It enables the calculation of a mean and identification of anomalies.**

[2]

**Total Marks for Question Set 12: 10**

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