EXPERIMENT / INVESTIGATION PROBLEMS

**Question 37 (8 marks)**

Hydrogen peroxide can be decomposed, as shown in the equation below, by a range of

catalysts, including enzymes.

2 H2O2(aq) → 2 H2O(ℓ) + O2(g)

A researcher set out to determine the effect of enzymes from different foods on the rate of

decomposition of hydrogen peroxide. She added equal masses of liver, potato, capsicum and

celery (each of which has an enzyme that decomposes hydrogen peroxide) to separate solutions

of hydrogen peroxide. She then monitored the decomposition of hydrogen peroxide using the

experimental apparatus shown in the diagram below. As the hydrogen peroxide decomposed

the bead of mercury moved along the graduated tube, which was open to the atmosphere.



(a) What was being measured by the movement of the mercury bead? (1 mark)

(b) What other quantity needed to be measured to determine the rate of decomposition?

(1 mark)

(c) List **three** variables that needed to be controlled in this experiment. (3 marks)

(d) In this experiment, the rate of reaction was measured by the rate of formation of oxygen. What other parameter in the system changes as the reaction proceeded? (1 mark)

(e) State the role of a catalyst in a chemical reaction and explain how its effect is achieved. (2 marks)

10. The moisture content of soil is one of its most important properties. Before buying a block of land a student brings in a sample and heats it in an oven set at 105oC until constant mass is achieved. These results are obtained:

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| Initial mass | 137.850 g |
| Mass (after 45 min) | 128.843 g |
| Mass (after 60 min) | 122.635 g |
| Mass (after 1 hour 15 min) | 120.235 g |
| Mass (after 1 hour 30 min) | 120.233 g |
| Mass (after 1 hour 45 min) | 120.234 g |

(a) Calculate the percentage mass of moisture in the soil sample.

[2 marks]

(b) Why did the student not continue heating the sample for a further two sets of 15 minute intervals?

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[2 marks]

(c) Suggest **two** improvements the student could make to the procedure so that it gives a better idea of the level of moisture in the block of land under investigation.

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[2 marks]