

ADVANCED GCE**BIOLOGY**

Practical Examination 2 (Part B – Practical Test)

2806/03/TEST

Candidates answer on the Question Paper

OCR Supplied Materials:

- Slides **K1** and **K2**

Other Materials Required:

- Candidate's Plan (Part A of the Practical Examination)
- Electronic calculator
- Ruler (cm/mm)

Tuesday 25 May 2010
Morning

Duration: 1 hour 30 minutes

Candidate
Forename

Candidate
Surname

Centre Number

Candidate Number

INSTRUCTIONS TO CANDIDATES

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your Candidate Number, Centre Number and question number(s).

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **60**.
- In this Practical Test, you will be assessed on the Experimental and Investigative Skills:
Skill I: Implementing
Skill A: Analysing evidence and drawing conclusions
Skill E: Evaluating.
- You may use an electronic calculator.
- You are advised to show all the steps in any calculations.
- This document consists of **11** printed pages and a Report Form. Any blank pages are indicated.

FOR EXAMINER'S USE

Qu.	Max.	Mark
Planning	16	
1	28	
2	16	
TOTAL	60	



Answer **all** the questions.

Question 1 [65 minutes]

The purpose of this investigation is to find the effect of different concentrations of leaf extract on the relative rate of the light dependent stage of photosynthesis.

The transfer of electrons and hydrogen ions to molecules called hydrogen acceptors takes place during the light dependent stage of photosynthesis. An acidified purple-pink solution of potassium manganate(VII) can act as a hydrogen acceptor and can be reduced to a colourless solution of manganese (II) ions during the light dependent stage.

In this investigation, you will mix samples of a leaf extract in dilute sucrose solution with acidified potassium manganate(VII) and record how long it takes for the purple-pink colour to disappear.

Sulphuric acid is an irritant.



Potassium manganate(VII) solution is harmful.



Safety glasses and protective gloves must be worn and care taken when handling these chemicals.

Wash off any splashes immediately with cold water.

Proceed as follows:

- 1** You are provided with five boiling tubes labelled **A** to **E**.

Stir the leaf extract thoroughly.

Use a 5cm³ syringe and a 10cm³ syringe to make up five different mixtures of leaf extract and sucrose solution as shown in the table below.

Table 1.1

tube	volume of leaf extract / cm ³	volume of sucrose solution / cm ³	concentration of leaf extract / arbitrary units
A	5.0	5.0	50
B	4.0	6.0	40
C	3.0	7.0	30
D	2.0	8.0	20
E	1.0	9.0	10

Read steps 2 to 8.

Note that you will record your results in the space provided on page 4.

3

- 2 Use a 1 cm³ syringe to add 1 cm³ of sulphuric acid to tube **A**.
- 3 Pour the contents of tube **A** into the flat-bottomed tube. Place this tube on a white tile so that the tube is about 20 cm in front of the bench lamp. Switch on the bench lamp and shine the light at the extract.
- 4 Use a clean 1 cm³ syringe to add 1 cm³ of potassium manganate(VII) to the flat-bottomed tube.

Immediately start the timer and shake the tube gently to mix the contents.

*Leave the tube on the tile and do **not** shake it again.*

- 5 Record the time taken for the purple-pink colour to disappear. If the purple-pink colour has not disappeared after ten minutes, record the time as infinity (∞).

Ignore any purple-pink colour that may remain at the surface.

Note that you are provided with two flat-bottomed tubes in case you wish to test two leaf concentrations at the same time.

- 6 Calculate the relative rate of reaction using the following formula:

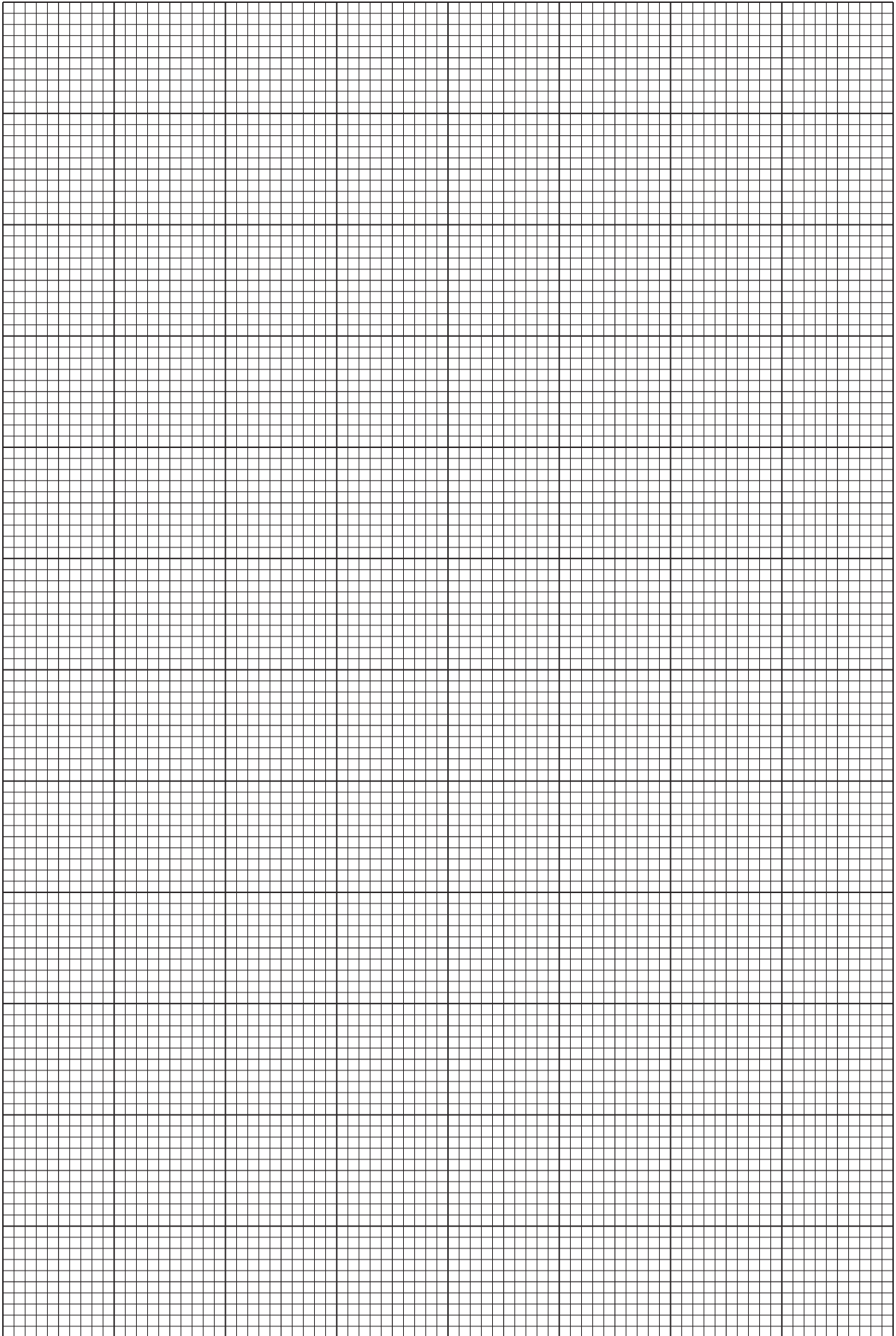
$$\text{relative rate of reaction} = 1000/t \text{ (where } t = \text{time in seconds)}$$

If the time recorded was infinity, record the relative rate of reaction as 0.

- 7 Empty the contents of the flat-bottomed tube into the beaker labelled 'waste'. Rinse the tube with water.
- 8 Repeat steps **2** to **7** with each of the remaining tubes **B** to **E**.

(a) Record your results in a suitable format in the space below.

(b) Draw a graph on page 5 to illustrate your results.



(c) Describe **and** explain the pattern of your results.

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- (d) In the preparation of the leaf extract, leaves were homogenised in a blender with sucrose solution. This procedure broke open the cells to release chloroplasts into the sucrose solution.

In step 1, you used sucrose solution to prepare the five concentrations of leaf extract.

Explain why sucrose solution was used in this investigation to prepare the leaf extract and make the dilutions instead of using water.

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[Total: 28]

Question 2 [25 minutes]

Slide **K1** is a transverse section of a sun leaf of the beech tree, *Fagus sylvatica*. Sun leaves are found on the upper branches of the tree where the light intensity is high.

Examine **K1** with the lenses of your microscope.

- (a) Make a large, labelled drawing of three cells from the palisade mesophyll of the leaf together with adjacent cells of the upper epidermis.

Annotate your drawing to show how the **palisade mesophyll cells** are adapted for photosynthesis.

- (b) Describe **two other** ways, visible in slide **K1**, in which the structure of the leaf of *F. sylvatica* is adapted for photosynthesis.

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Examine slide **K2** which is a transverse section of a leaf from *Erica vegans*.

E. vegans lives in a drier habitat than that occupied by *F. sylvatica*.

(c) State **three** ways in which the structure of the leaf in slide **K2** differs from that in slide **K1**.

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(d) State and explain how the structure of the leaf of *E. vegans* shows adaptations to its habitat.

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[Total: 16]

END OF QUESTION PAPER

REPORT FORM

The teacher responsible for the supervision of the Practical Test is asked to report on the following:

- (a) Any particular difficulties encountered in making preparations for the Practical Test.
- (b) Whether it was necessary to make any substitutions for the materials listed in the Instructions. Submit a copy of the results obtained by a teacher or technician, using the substituted materials, on top of the candidates' scripts.
- (c) Any difficulties experienced by the candidate due to deficient materials or faulty apparatus. If so, give brief details.
- (d) Any assistance given to the candidate with respect to colour blindness or other physical disability. If so, give brief details and attach a copy of the letter giving permission.

Other cases of hardship, for example illness, should be reported directly to OCR, by the Examinations Officer, using the Special Consideration form.

Signed

Information that applies to **all** candidates should be given on the first candidate's script **only** or supplied on a separate sheet placed on top of the candidate's scripts.

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