

Advanced Subsidiary GCE

F223

HUMAN BIOLOGY

Unit F223: Practical Skills in Human Biology
Qualitative Task

Specimen Task

For use from September 2008 to June 2009.

All items required by teachers and candidates for this task are included in this pack.

INFORMATION FOR CANDIDATES

- Qualitative Task: Detecting the presence of glucose in a solution

INFORMATION FOR TEACHERS

- Mark scheme
- Instructions for Teachers and Technicians.

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Candidates answer on this task sheet.

INSTRUCTIONS TO CANDIDATES

- Answer **all** parts of the task.

INFORMATION FOR CANDIDATES

- The total number of marks for this task is **10**.

ADVICE TO CANDIDATES

- Read each part carefully and make sure you know what you have to do before starting your answer.

| FOR TEACHER'S USE | | |
|-------------------|------|------|
| | Max. | Mark |
| TOTAL | 10 | |

| | Max. | Mark |
|-------|------|------|
| TOTAL | 10 | |

This task consists of **5** printed pages and **1** blank page.

Qualitative Task: Detecting the presence of glucose in a solution

Background

Humans with the capacity to regulate blood glucose levels do not excrete glucose. However, in diabetics, if the concentration of blood glucose goes above 180mg per 100cm³, glucose may be detected in the urine.

Introduction

You are required to estimate the glucose content of urine in two samples, A and B, using Benedict's reagent. Glucose will, when heated, reduce copper (II) sulphate in Benedict's solution to produce a precipitate of copper (I) oxide. A green precipitate indicates relatively little glucose, yellow somewhat more, brown even more and red the most.

This will be done in two stages. In stage 1, you will use a series of five glucose solutions to prepare five colour standards. In stage 2, you will use these colour standards to determine the glucose content of the two urine samples.

It is your responsibility to work safely and to organise your time effectively.

Proceed as follows:

Stage 1

Set up a water bath to a depth of about 6cm and heat to boiling or use a controlled water bath.

You are provided with five beakers labelled **0.1%**, **0.5%**, **1.0%**, **2.0%** and **4.0%**, to indicate different concentrations of glucose.

Carry out the Benedict's test on the five different solutions of glucose provided as follows:

- 1 Add 5.0 cm³ of Benedict's solution to each boiling tube.
- 2 Add 5.0 cm³ of each of the glucose solutions to the appropriate boiling tubes, using a clean syringe each time.
- 3 Stir the contents with a clean, dry glass rod.
- 4 Place all five boiling tubes in a rack in the boiling water for **two** minutes.
- 5 Carefully remove the tubes from the boiling water and place them in a rack in order of increasing concentration of glucose.
- 6 Stir the contents with a clean, dry glass rod.

Observe the contents of the tubes immediately after stirring and record your observations, in the most suitable format, in the space provided.

| glucose concentration / % | *mass of glucose / mg | observation |
|---------------------------|-----------------------|-------------|
| 0.1 | 5 | |
| 0.5 | 25 | |
| 1.0 | 50 | |
| 2.0 | 100 | |
| 4.0 | 200 | |

*5 cm³ of each glucose solution contains the mass of glucose shown in the table.

Stage 2

Carry out a Benedict's test on each of the two samples of 'urine', **A** and **B**.

- (a) Record your observations of the Benedict's tests on the urine samples A and B, and the estimated mass of glucose in a suitable table.

[Turn over

(b) Describe how you made the comparison between your results from the urine samples and the colour standards as accurate as possible.

.....

.....

.....

.....

.....

.....

Total [10]

END OF TASK

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Unit F223: Practical Skills in Human Biology:
Qualitative Task

Specimen Mark Scheme

The maximum mark for this task is **10**.

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| | | Max. Mark |
|-------------------|---|------------------|
| stage 1 | qualitative observations of colour changes made using more than single words; | 1 |
| | results show expected trend; | 1 |
| stage 2(a) | qualitative observations of colour changes made using more than single words; | 1 |
| | observations recorded logically and in a format that allows comparisons to be made; | 2 |
| | | |
| (b) | use same volume of Benedict's solution; | 1 |
| | use same volume of urine as original glucose solutions; | 1 |
| | stir for same time; | 1 |
| | leave in water bath for same time; | 1 |
| | record colour after same time; | 1 |
| Total | | [10] |

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HUMAN BIOLOGY

F223

Unit F223: Practical Skills in Human Biology:
Qualitative Task

Instructions for Teachers and Technicians

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This task relates to Module 4, Unit F222. There is no time limit but it is expected that it can be completed within one timetabled lesson.

It is assumed that you will have completed the teaching of the above module before setting your students this task. This module has links to other modules which contain related learning experiences – please refer to your specification.

Candidates may attempt more than one qualitative task with the best mark from this type of task being used to make up the overall mark for Unit F223.

Preparing for the assessment

It is expected that before candidates attempt Practical Skills in Human Biology: Qualitative Task (Unit F223) they will have had some general preparation in their lessons. They will be assessed on a number of qualities such as demonstration of skilful and safe practical techniques using suitable qualitative methods, the ability to make and record valid observations, and the ability to organise results suitably. It is therefore essential that they should have some advance practice in these areas so that they can maximise their attainment.

Preparing candidates

At the start of the task the candidates should be given the task sheet.

Candidates must work on the task individually under controlled conditions with the completed task being submitted to the teacher at the end of the lesson. Completed tasks should be kept under secure conditions until results are issued by OCR.

Candidates should not be given the opportunity to redraft their work, as this is likely to require an input of specific advice. If a teacher feels that a candidate has under-performed, the candidate may be given an alternative task. In such cases it is essential that the candidate be given detailed feedback on the completed assessment before undertaking another Qualitative Task. Candidates are permitted to take each task **once** only.

Assessing the candidate's work

The mark scheme supplied with this pack should be used to determine a candidate's mark out of a total of 10 marks. The cover sheet for the task contains a grid for ease of recording marks. To aid moderators it is preferable that teachers mark work using red ink, including any appropriate annotations to support the award of marks.

Notes to assist teachers with this task

Teachers must trial the task before candidates are given it, to ensure that the apparatus, materials, chemicals etc provided by the centre are appropriate. The teacher carrying out the trial must complete a candidate's task sheet showing the results attained, and retain this, clearly labelled, so that it can be provided to the candidates when requested.

Health and Safety

Attention is drawn to Appendix F of the specification.

Technicians' list

Students must not be told any information about these materials apart from what is given on the task sheets.

Each student will require:

Materials

- 50 cm³ Benedict's solution (qualitative) labelled
- Two corked specimen tubes labelled A and B containing about 2 cm³ of artificial urine:
A is distilled water
B is 1.0% glucose
- 10 cm³ of the following glucose solutions made up using distilled water:
0.1%, 0.5%, 1.0%, 2.0% and 4.0%.

Each glucose solution to be provided centrally in a corked bottle or conical flask along with a small beaker labelled with the correct concentration and 5.0 cm³ syringe to allow 0.5 cm³ to be withdrawn.

Apparatus:

- safety goggles
- 7 boiling-tubes in a boiling-tube rack
- permanent marker or labels
- 5x 5cm³ syringe
- 2 x glass rod
- paper towel to dry glass rod
- stopwatch or stop clock (with minutes)

Access to:

- a thermostatically-controlled water bath set at boiling with boiling-tube racks

or

each student:

- beaker
- Bunsen
- tripod
- gauze
- heat proof mat
- access to cold water tap

Note: The quantities of chemicals required are approximate and due allowance should be made for wastage.

While this list is intended to meet all candidates' requirements, teachers may vary the materials, chemicals and apparatus provided in order to:

- ensure that the experiments guarantee appropriate outcomes for candidates
- make use of resources available at the centre, without the need to make special purchases.

Such changes may be made without consulting OCR. A note of any significant changes must be sent to the moderator when a sample is requested for moderation.

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