PAG 9 Qualitative Testing: OCR A Level Biology Exam Questions by Top

8 questions · 27 marks · about 32 minutes. Answer in the spaces, then check the mark schemes at the end.

Question 1 · AS Paper 2 · June 2023 · Q3(a)(i) · 1 mark

3 (a) A group of students was provided with a sample of an unknown liquid and various chemical reagents. It was suggested that the sample of unknown liquid contained protein.

Here is the chemical test proposed by one of the students to test this suggestion:

- Add 3 cm^3 of unknown liquid sample to an equal volume of sodium hydroxide solution
- Mix
- Leave to stand for 5 minutes.

(i) The above test would not detect the presence of protein in the sample.

State the change that needs to be made to this test to enable protein to be detected.

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..... **[1]**

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Question 2 · information from earlier in the question

1 Aphids are small insects that feed on the sap that is translocated through the plant in the phloem. These insects insert their fine mouthparts, stylets, into phloem tissue and allow the sap to flow out of the phloem.

One method of collecting sap is to allow the aphid to feed as shown in Fig. 1.

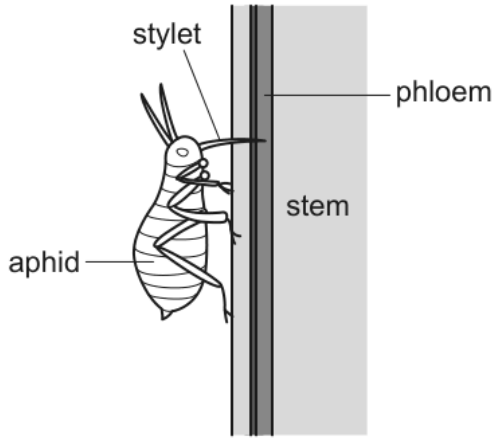

Fig. 1

The aphid is then anaesthetised and the stylet is cut off close to the aphid's head. The sap can then be collected and analysed.

A researcher analysed the sap collected and the results are shown in Table 1.

Substance tested for	Conclusion
glucose	negative
starch	negative
sucrose	positive

Table 1

(a) (i) Phloem tissue is made up of different cell types.

Identify the type of phloem cell into which the stylet is inserted to obtain the sap.

..... **[1]**

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Question 2 · AS Paper 2 · June 2019 · Q1(a)(ii) · 4 marks

(ii) Separate samples of the sap were tested for the presence of glucose, starch and sucrose.

Using Table 1, complete the following passage, using the most appropriate terms.

In order to test for the presence of glucose, ...

..... was added to the sap sample and boiled. The final colour was

..... and so it was possible to arrive at the conclusion shown in Table 1.

When iodine solution was added to the sap sample, the final colour was

..... . To test for the presence of sucrose, the sample was first boiled with ..... . After the rest of the test had been completed, the colour of the mixture indicated that sucrose was present in the sample.

[4]

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Question 3 · AS Paper 2 · June 2023 · Q3(b) · 6 marks

(b)* The students were provided with another sample of an unknown liquid. They carried out chemical tests on this sample to determine what biological molecules were present. Their findings are shown in the table below.

Biological molecule	Present
Lipids	Yes
Starch	Yes

Describe the chemical tests you would carry out to see if the students' findings were correct. Include the **apparatus** and **reagents** you would use and the results that you would expect.

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..... **[6]**

Additional answer space if required.

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Question 4 · information from earlier in the question

4 **(a)** Fungi produce enzymes to digest complex food substances. Amylase is an enzyme that catalyses the conversion of starch to maltose.

- A sample of the fungus *Amanita citrina* was placed on agar in a petri dish.
- The agar contained starch.
- The dish was incubated until the thread-like hyphae had grown a few centimetres.
- Iodine solution was then poured onto the surface of the agar.

A diagram representing the results is shown in Fig. 4.

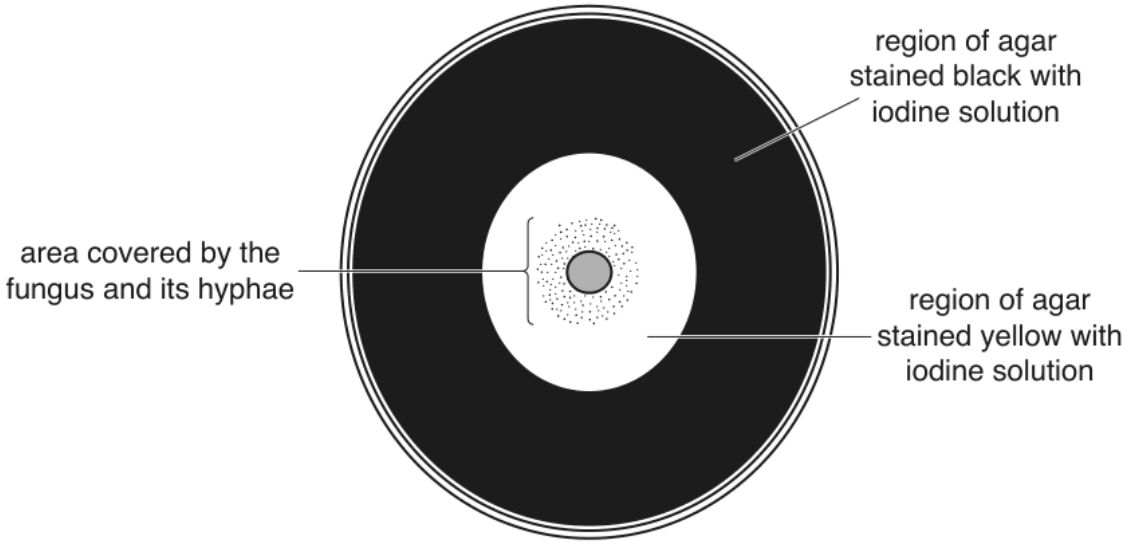

Fig. 4

(i) To which genus does this fungus belong?

..... **[1]**

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Question 4 · AS Paper 2 · June 2016 · Q4(a)(ii) · 1 mark

(ii) The region of yellow staining shown in Fig. 4 includes part of the agar where the fungus had not yet grown.

What does this pattern indicate about the action of the fungal enzymes?

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..... **[1]**

Turn over

Question 5 · AS Paper 2 · June 2017 · Q6(b)(i) · 4 marks

(b) The students wrote the following hypothesis:

'The higher the concentration of glucose in the fruit juice, the sweeter it will be.'

(i) Describe how you would carry out a controlled experiment to test this hypothesis **without** using a colorimeter.

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..... **[4]**

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Question 6 · AS Paper 2 · June 2017 · Q6(b)(ii) · 1 mark

(ii) Suggest one reason why the results for this experiment might **not** support the students' hypothesis.

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..... **[1]**

Question 7 · A level Paper 2 · June 2017 · Q20(c) · 4 marks

(c) Lactose is a reducing sugar.

Benedict's reagent can be used to detect the presence of lactose in a solution.

A colorimeter can be used to measure the concentration of lactose.

The colorimeter first needs to be calibrated.

Describe how a method that uses Benedict's reagent and a colorimeter could be calibrated to measure the concentration of lactose in an unknown sample.

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..... **[4]**

Turn over

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Question 8 · information from earlier in the question

(c) Invertase is an enzyme that catalyses the following reaction:

sucrose ⟶ glucose + fructose.

Invertase is present in cells of baker's yeast, a type of fungus.

It is possible to immobilise invertase and it is also possible to immobilise yeast cells.

(i) Suggest **one** reason why using immobilised yeast might be more expensive than using immobilised invertase.

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..... **[1]**

Turn over

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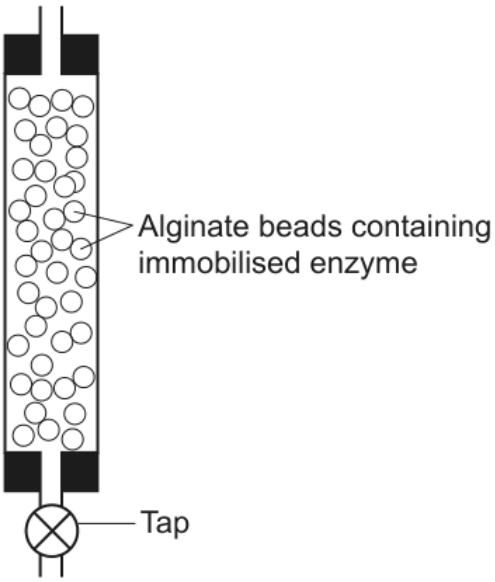
Question 8 · A level Paper 2 · June 2023 · Q18(c)(ii) · 6 marks

Investigations involving immobilised enzymes can be carried out using equipment like that shown in **Fig. 18.2**. A glass column with an outlet at the bottom is filled with alginate beads containing immobilised enzyme. The substrate can be added at the top and the product collected at the bottom.

Fig. 18.2



(ii)* A student wanted to compare the ability of immobilised invertase and immobilised yeast cells to hydrolyse sucrose.

The student had access to the following:

- sucrose solution
- alginate beads containing invertase
- alginate beads containing yeast cells
- glass columns such as the one shown in **Fig. 18.2**
- standard laboratory equipment and reagents.

Outline a valid method the student could use to compare the activity of immobilised invertase and immobilised yeast cells.

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Mark schemes

Question 1 · AS Paper 2 · June 2023 · Q3(a)(i) · 1 mark

3	(a)	(i)	add Biuret (instead of sodium hydroxide) ✓	1	3.4

ALLOW add copper sulphate (solution)
IGNORE ref to changing temperature

Question 2 · AS Paper 2 · June 2019 · Q1(a)(ii) · 4 marks

	(ii)		4
		Benedict's / Fehling's (solution / reagent) ✓	
		blue / turquoise ✓	
		orange / yellow / brown ✓	
		acid ✓	

Mark the first answer in each space. If an additional answer is given that is incorrect, then = **0 marks**

IGNORE dark / light / cloudy / opaque

IGNORE dark / light / cloudy / opaque

ALLOW named e.g. HCl, H_2SO_4, HNO_3
IGNORE spelling error e.g. hydrocholic

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***(b)**		Please refer to the marking instructions on page 4 of this mark scheme for guidance on how to mark this question. **Level 3 (5–6 marks)** Full and detailed description of the tests for both biological molecules correctly described, including reagents, some apparatus, and correct results in accordance with the table. *There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.* **Level 2 (3–4 marks)** A clear account of both tests for both biological molecules and correct results in accordance with the table **OR** a full and detailed description of one of the tests with limited account for the other. *There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.* **Level 1 (1–2 marks)** A limited account of one of the tests for biological molecules with correct result. *There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant.* **0 marks** *No response or no response worthy of credit.*

6	**1.2 x 3** **2.7 x 2** **3.2 x 1**	For highest band correct tests for both biological molecules are required. Reagents correctly named. Some apparatus mentioned **Indicative points can include:** <u>*Lipids*</u> **Apparatus** test tube/AW

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Question 4 · AS Paper 2 · June 2016 · Q4(a)(ii) · 1 mark

4	(a)	(ii)	*one from* 1 (starch) digestion in the regions where the , fungus / hyphae , not present ✓ 2 *enzymes / they , are* released / diffuse away , from the fungus **or** extracellular / secreted ✓

1	1 **ACCEPT** breaks down (starch) in the , region / area / agar , around the fungus

Question 5 · AS Paper 2 · June 2017 · Q6(b)(i) · 4 marks

Question			Answer	Mark	Guidance
6	(b)	(i)	**1** taste the fruit juices to see how sweet they are ✓	4 max	**1** could be in the context of different juices **or** a series of dilutions of the same juice (to give different glucose concentrations) **or** a series of glucose concentrations
			2 place a sample of each fruit juice in a biosensor **and** take the reading **or** test each fruit juice with , Benedict's / diastix / clinistix / (diagnostic) test strip **and** observe colour(s) ✓		**2 ACCEPT** semi-quantitative test for reducing sugar Benedict's tests on each fruit juice **and** weigh mass of precipitate formed for each juice perform **ACCEPT** plausible way of determining glucose concentration e.g. relative density / specific gravity / mass change as a result of osmosis Benedict's – blue to red with increasing concentration diastix – green/blue to red clinistix – green/blue to red **or** pink to (dark) purple
			3 obtain rank order for , sweetness / fruit juice glucose concentration ✓		
			4 compare rank orders (of fruit juices) for sweetness and glucose concentration ✓		**4 ACCEPT** the use of a statistical test if rank orders for both are numerical
			5 how a variable was controlled during , taste / glucose concentration , test ✓		**5** e.g. use same , number of drops / volumes , of fruit juice cleanse palate between juices blind taste test / stated way to avoid bias tasted by a number of subjects (and results pooled) keep test strip in sample for same length of time add excess Benedict's heat for same length of time / at the same temperature (Benedict's only) filter precipitate in same way (semi-quantitative Benedict's only)

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Question 6 · AS Paper 2 · June 2017 · Q6(b)(ii) · 1 mark

6	(b)	(ii)	tasting is , subjective / (only) qualitative / not quantitative **or** hard to quantify sweetness **or** people may have different , judgement / opinion / taste buds ✓ colour judgement (in Benedict's) is subjective ✓ (juice) may contain , sucrose / fructose / other (named) sugar / (artificial) sweetener ✓

1 max	**IGNORE** accuracy / reliability **ACCEPT** ref to biased opinion **ACCEPT** sensible ref to acidity in juice masking sweetness **IGNORE** ref to 'other ingredients' unqualified

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Question 7 · A level Paper 2 · June 2017 · Q20(c) · 4 marks

	(c)		1 zero the colorimeter / set to zero ✓ 2 using blank ✓ 3 use red filter ✓ 4 use known concentrations (of lactose) ✓ 5 (produce) serial / series , dilutions ✓ 6 construct calibration curve ✓
			7 test unknown sample (using the same method) ✓ 8 use / read from , graph / calibration curve , to determine (unknown) concentration ✓
			Total

Question	Answer
4 max	**ALLOW** calibrate to zero **3 ALLOW** red light / orange filter **4 ALLOW** a list of stated concentrations **5 ALLOW** clear description **6 ALLOW** plot concentration against , transmission / absorbance
	8 Cannot be assumed from mp 6
16	

Marks	Guidance

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Question 8 · A level Paper 2 · June 2023 · Q18(c)(ii) · 6 marks

	(c)*	**(ii)**	***Please refer to the marking instructions on page 4 of this mark scheme for guidance on how to mark this question.***			

			Level 3 (5–6 marks)
			Outlines a valid investigation that explains how the independent variable should be changed **AND** how the dependent variable should be measured **AND** mentions controlling other variables.
			
			There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.
			
			Level 2 (3–4 marks)
			Outlines a valid investigation that mentions the independent variable **AND** the dependent variable **AND** control variables.
			
			There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence
			
			Level 1 (1–2 marks)
			Attempts to outline a valid investigation but does not discuss one of the variables.
			
			There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant
			
			0 marks
			No response or no response worthy of credit.
				6	3.3	**Indicative points may include**
						
						Independent variable
						• set up two columns
						• one with invertase beads and one with yeast beads
						• use of control column
						
						Dependent variable
						• measure product for reducing sugar
						• using Benedict's test
						• quantity can be estimated by
						  ○ colour chart or testing strips
						  ○ colorimeter
						
						Control variables
						• number or volume of beads in each column
						• concentration of substrate solution added to columns
						• volume of substrate added to columns
						• substrate exposed to columns for same time
						• temperature
						• pH
						• identical procedure for measuring product
						• zero colorimeter

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