Antiseptics, antibiotics and bacterial growth

Biology required practical | AQA GCSE Biology 8461 only (not Combined Science) | 14 questions, 37 marks

GCSE science required practicals

This practical online

Name: _____ **Date:** _____ **Score:** _____ / 37

Aim: To compare how well different antiseptics stop the growth of bacteria by measuring the clear zones they produce on an agar plate.

Equipment: sterile Petri dishes of nutrient agar; culture of a harmless bacterium in nutrient broth; sterile pipette or sterile spreader; sterile paper discs of the same size; antiseptic solutions to test and sterile water; forceps; Bunsen burner and heat-proof mat; disinfectant for the bench; clear adhesive tape; marker pen; incubator set to 25 °C; ruler marked in mm.

Results

Zainab compared four antiseptics, A to D, and a disc soaked in sterile water. She set up three plates and measured the diameter of the clear zone around each disc after 48 hours at 25 °C.

Disc soaked in	Diameter of clear zone on plate 1 in mm	Diameter of clear zone on plate 2 in mm	Diameter of clear zone on plate 3 in mm
Antiseptic A	14	15	13
Antiseptic B	22	21	9
Antiseptic C	8	9	9
Antiseptic D	18	17	19
Sterile water	0	0	0

Questions

1 Name the independent variable and the dependent variable in Zainab's investigation. (2 marks)

2 Zainab cut all the paper discs with the same hole punch. Explain why the discs needed to be the same size. (2 marks)

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3 Why did Zainab include a disc soaked in sterile water? (1 mark)

4 Describe **three** steps Zainab should take to stop other microbes getting onto her agar plate. (3 marks)

5 After placing the discs, Zainab taped the lid on with two short strips of tape and incubated the plate at 25 °C.

a. Why must the lid not be sealed all the way round?

b. Why is the plate incubated at 25 °C rather than 37 °C? (3 marks)

6 Look at the results for Antiseptic B.

a. Which value is anomalous?

b. What should Zainab do with this value when working out the mean? (2 marks)

7 Calculate the mean diameter of the clear zone for Antiseptic B, leaving out the anomalous result. (2 marks)

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8 Use your answer to the last question to calculate the area of the clear zone for Antiseptic B.

Use area = πr^2. Give your answer to 3 significant figures. Show your working.

(3 marks)

9 The mean diameter of the clear zone for Antiseptic A is 14 mm. Calculate the area of this clear zone to 3 significant figures.

(2 marks)

10 **Higher tier**

On another plate, a new antiseptic gave a circular clear zone with an area of 254 mm^2.

Calculate the diameter of this clear zone. Give your answer to 3 significant figures. Show your working.

(3 marks)

11 **Higher tier**

A broth starts with 500 bacteria. Under the conditions used, the bacteria divide once every 25 minutes.

Calculate how many bacteria there will be after 5 hours. Give your answer in standard form to 2 significant figures. Show your working.

(3 marks)

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12 Zainab concluded that Antiseptic B is the best at stopping bacterial growth. Use the results to explain whether she is right.

(2 marks)

13 Some of the clear zones were not perfect circles, and the edges were fuzzy.

a. Suggest how Zainab could get a more accurate measurement of a zone that is not a perfect circle.

b. The three results for Antiseptic D were 18 mm, 17 mm and 19 mm. What does this tell you about the precision of these results?

(3 marks)

14 Plan an investigation to find how the concentration of one antiseptic affects the growth of bacteria on agar plates.

(6 marks)

End of questions | Total 37 marks | The answers sheet has the full method as revision notes.

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