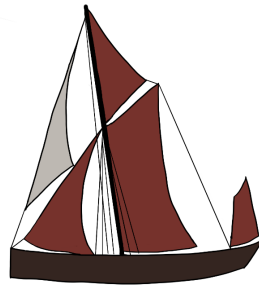

AQA

CULTURING MICROORGANISMS NOTES

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AQA Culturing Microorganisms Notes

Culturing microorganisms is a key skill in biology. If you go on to do a biology course at university you will do a lot of culturing, especially when doing microbiology modules. But what does “*culturing microorganisms mean*”?

Culturing microorganisms: a method of multiplying microorganisms by letting them reproduce in a culture medium under controlled conditions.

Culture medium: a substance containing nutrients in which cells or microorganisms can be grown.

The most common culture mediums used are nutrient agar jelly and nutrient broth solution.

Key note: the culture mediums must be sterile (have no microorganisms present in them) before they are used. Otherwise, they will be contaminated and you will have to begin again.

Happy accident: In the 1920's a Scottish microbiologist was making some nutrient agar plates to grow some microorganisms. He left the plates open near a window to cool before use. The window was above a bakery and a few fungal spores managed to land on the plates before they were covered. Once the bacteria that he wanted to grow had developed he noticed that some fungus had grown as well. It was then that he noticed there was a clear patch of agar between the bacteria colonies and the fungus.



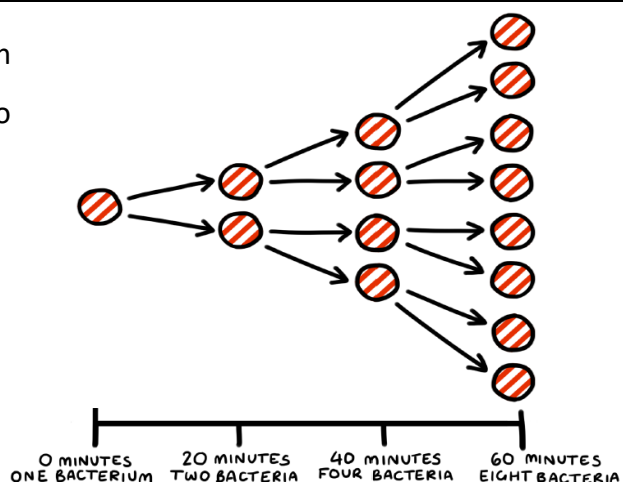
Sir Alexander Fleming

He figured out that the only way this could happen was if the fungus was producing a chemical that killed bacteria. His name was Alexander Fleming and he had just discovered the first antibiotic drug.

How do Bacteria Reproduce?

Binary fission: a type of reproduction, where an organism reproduces by dividing in two. Each cell produced is an exact copy of the parent cell. Bacteria reproduce via binary fission.

Under the right conditions some bacteria can reproduce every 20 minutes! This allows them to increase in number very quickly!



AQA Culturing Microorganisms Notes

Aseptic Technique

Aseptic technique: refers to techniques used to prevent contamination by unwanted microorganisms when growing microorganisms.

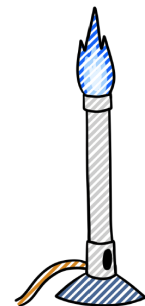
What do we need to know about aseptic technique?

1. How each technique works.
2. Some of the apparatus used and why it's used.

How each aseptic technique works!

- **Working near the Bunsen burner**

This is one of the most common techniques used in microbiology. Working near to a lit Bunsen burner means that you are working in a pocket of sterile air. This helps to reduce the chance of contamination.

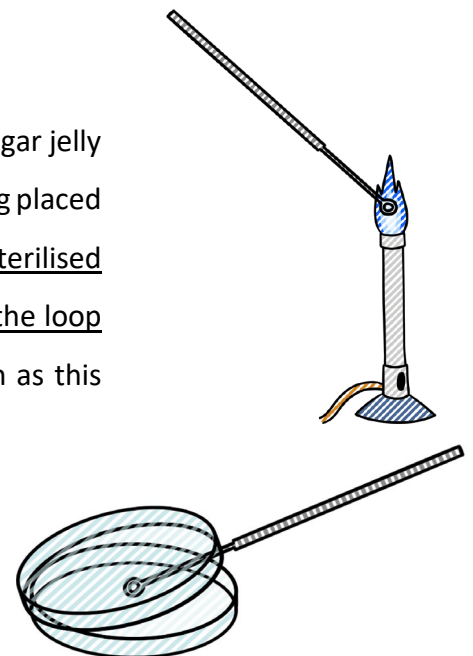


- **Use of an autoclave**

Autoclaves are machines that can create high temperatures and pressures. This is used to sterilise equipment such as petri dishes and agar jelly.

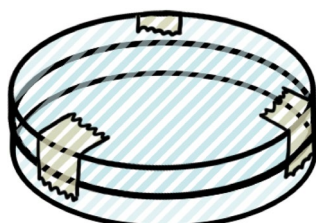
- **Sterile inoculation loop**

An inoculation loop is often used to place microorganisms onto the agar jelly of a petri dish. It is very important that this loop be sterile before being placed into the microorganism that you want to culture. The loop can be sterilised by placing it into the roaring flame of a Bunsen burner and holding the loop there for a few moments. It is important not to put the loop down as this would contaminate the loop.



- **Keep petri dishes and culture containers sealed**

This is quite obvious. To prevent contamination, petri dishes and culture containers should be kept sealed when they are not in use.



Calculating areas on agar plates

I have seen a number of these types of questions in recent years. Part of a policy of bringing more maths into biology examinations to have more of a problem-solving aspect in the papers.

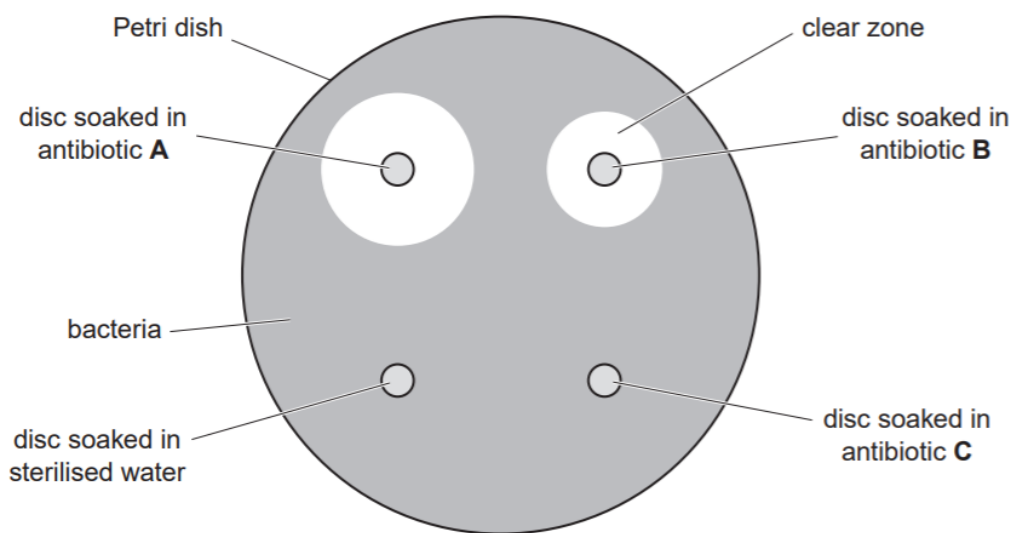
These are quite straight forward. If you are comfortable calculating the area of a circle these should be no issue at all 😊

$$\text{Area of a circle} = \pi r^2$$

Exam note: please ensure it is the **radius** that you are using in the calculation as questions often give the diameter.

Take the following example below from *OCR 21st Century 2014 Higher Paper 4 Q4*.

Example: The diagram shows what a student sees on one of the dishes after it has been incubated.



not to scale

The diameter of the clear zone around the disc soaked in antibiotic A is 23 mm. Calculate the area of this clear zone. Use the equation: $\text{area of clear zone} = 3.14 \times r^2$.

Give your answer to 3 significant figures.

(3 marks)

Solution

$$3.14 \times (11.5)^2 = 415.265$$

To three significant figures = 415mm²

Not bad at all for three marks 😊