

Comparing the antibacterial properties of metals

Practical sheet 1 – Investigating the antibacterial properties of metals

Equipment and materials

- 1 cm x 1 cm pieces of metal e.g. copper, zinc, stainless steel, aluminium
- Universal bottles containing 5 cm³ sterile nutrient broth
- sterile Petri dishes containing nutrient agar
- test tube of sterile water
- sterile 1 cm³ syringe or pipette
- sterile forceps
- inoculation loop
- Bunsen burner and heatproof mat
- marker pen
- tape to secure Petri dishes

Method

1. Using the sterile syringe, or pipette and sterile water, moisten the skin of an unwashed finger.
2. Firmly rub the finger onto one of the pieces of metal.
3. Working close to the hot flame of a Bunsen burner, use sterile forceps to transfer the metal to a bottle of nutrient broth and replace the cap. Label the bottle with the type of metal inserted. Repeat steps 1 to 3, using a different finger for each piece of metal.
4. Leave one bottle of broth with NO piece of metal and label it 'control'. Shake all the bottles and leave them for at least 48 hours at 25 °C.
5. Label the bases of the sterile Petri dishes of nutrient agar (at the edge) so that you know which type of metal will be placed in each one. Label one Petri dish 'control'.
6. Sterilise the inoculation loop in the Bunsen burner flame and allow it to cool in the air for 5 seconds.
7. Open the first of the bottles containing a metal piece. Hold the cap in your hand and flame the neck of the bottle. Insert the inoculation loop into the broth, remove it and replace the cap.

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8. Working close to the Bunsen burner, lift the lid of the first Petri dish of nutrient agar just enough to give access (hold the lid horizontally above the agar). Spread the broth on the loop onto the agar surface at the left-hand side of the dish. Flame the loop again, let it cool and then repeatedly streak the broth from the starting point to dilute it, as shown in the diagram. Replace the lid of the Petri dish and re-flame the loop.
9. Repeat steps 6 to 8 using the remaining bottles with metal pieces in broth and the control broth.
10. Secure the lids of the plates to their bases by using 4 short strips of adhesive tape.
11. Turn the Petri dishes over (to prevent condensation dripping onto the agar surface) and incubate the plates at 25 °C for 48 hours.
12. Observe the plates carefully but do NOT open them.



Questions

1. Why were the pieces of metal in bottles of broth left at 25 °C for 48 hours?
2. Why is a 'control' prepared?
3. Why are the Petri dishes of agar incubated at 25 °C?
4. Why are the Petri dishes taped closed before incubation?
 - a) Is there any difference between the number of bacterial colonies present on each plate?
 - b) Suggest a reason for any difference.