**Which Household Cleaners or Soaps Work Best Against Bacteria?**

**Purpose:**

 This lab activity is to test the effectiveness of various household cleaning products or soaps for their antibacterial ability.

**Procedure:**

1. **Follow the directions for practicing aseptic technique. Keep the alcohol covered and 1 metre away from the Bunsen burner at all times!**
2. **Day 1:** Divide your plate into four sections with a marker and label them A - D.
3. Obtain a small clean test tube and add about 1cm of dH2O.
4. Flame your inoculator loop until it glows orange, let it cool for about 20 seconds, then collect a bacterial colony sample (**NOT** agar) from the prepared plates.
5. Place the inoculator into the test tube (careful not to touch the sides of the test tube) and mix your bacteria in the water. Flame your inoculator loop.
6. Carefully swirl the test tube until the bacteria has dissolved. Pour the liquid onto a new clean plate and cover the plate with the lid. Dispose of the test tube in the waste container as instructed.
7. Dip the glass spreader into alcohol, **cover the alcohol**, and then touch the spreader to the flame. Wait 10 seconds for the alcohol to burn off.
8. Open the agar plate and use the spreader to evenly distribute the liquid across the entire plate. Cover the plate and let it sit a few minutes until the liquid is absorbed.
9. Dip the glass spreader into alcohol, **cover the alcohol**, and then touch the spreader to the flame. Wait 10 seconds for the alcohol to burn off. Return the glass spreader and clean up your area. Wash your hands.
10. Collect 4 absorbent paper discs. Each disc will be immersed into a different cleaner or control. Record which cleaner you used in each quadrant in **Table 1**.
11. Use the forceps at each station to dip one disc into the cleaning product long enough to absorb the liquid. You want the disc wet, but not dripping.
12. Place this disc into the center of a quadrant on your dish.
13. Repeat steps 13 - 14 for two more discs in the cleaners of your choice.
14. The last disc will be immersed in distilled water then placed into quadrant D.
15. Tape your plate closed and incubate your plate upside down until next class.
16. **Day 2**: Observe your results, make a labelled sketch, and measure the **diameter of the zone of inhibition** (area with no bacterial growth) around each disc using a ruler.
17. Rank the cleaning products in terms of their effectiveness at killing *this* type of bacteria.

**Results:**

**Figure 1: Labelled Drawing of Bacterial Plate**

|  |  |  |  |
| --- | --- | --- | --- |
| **Quadrant** | **Cleaning Product** | **Zone of Inhibition Diameter (mm)** | **Rank in Antibacterial Effectiveness (1st, 2nd)** |
| **A** |  |  |  |
| **B** |  |  |  |
| **C** |  |  |  |
| **D** |  |  |  |

**Table 1: Effectiveness of Cleaning Products on Bacteria**

**Analysis:**

1. Describe the appearance of your plates after the incubation time. How can you tell if your bacteria were spread evenly or not?
2. What is the purpose of the agar plate?  Could you do this experiment without the **agar**?  Without the **incubator**?
3. Which cleaner was most effective against the bacterial growth and how do you know? Does this mean that this cleaning product would work best against all bacteria? **Explain**.
4. Which cleaning product did the worst job at killing bacteria and how do you know? Did this surprise you? **Explain**.
5. Which quadrant was your experimental control? **Why** is it important to the outcome of this experiment?
6. Describe any sources of error in your experiment and how you could improve your results.
7. Some types of bacteria can become resistant to cleaning products and antibiotics. Using what you know about **Natural Selection**, explain how this can happen.