Quantifying Antimicrobial Properties of Copper

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Project ID#

Q1: Research Question/Engineering Goal

RESEARCH QUESTION

Do different types of copper have antimicrobial properties?

HYPOTHESIS

Copper can interfere with the biological processes of bacteria, which gives copper antimicrobial processes?

MATERIALS

Copper 110 Alloy Plates	Copper Pennies
Copper BBs	Inoculating Loop
Agar Nutrient	E. Coli Bacteria
Ampicillin Antibiotic	Sterile Petri Dishes
Autoclave	Gloves
70% Alcohol	Bleach
Graduated Cylinder	Balance
Bio-Bag	Bunsen Burner
Incubator	

Q2: Methodolog y/Project Design

PROCEDURE: PLATE STREAKING

1. Sterilize inoculating loop in Bunsen Burner
2. Use loop to capture Escherichia Coli
3. Perform these streaks on "targets:" Copper 110 plates, Pennies, and BBs:

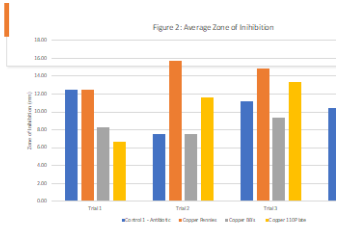
Streak 1: Glide inoculating loop tip back and forth across the agar surface to make a streak.
Streak 2: Reignite inoculating loop and cool by stabbing it into the agar away from the first (primary) streak. Draw loop tip through the end of the primary streak and, without lifting loop, make a zigzag streak across one quarter of the agar surface.
Streak 3: Reignite loop and cool in the agar as above. Draw loop tip through the end of the secondary streak, and make another zigzag streak in the adjacent quarter of the plate without touching the previous streak.
Streak 4: Reignite loop and cool it as above. Draw tip through the end of the tertiary streak, and make a final zigzag streak in remaining quarter of plate.

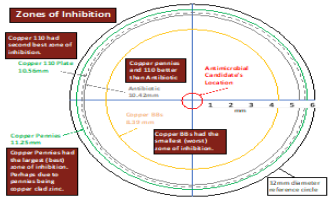
4. Place targets upside-down in 37°C incubator for 15-20 hours. (Inverted to prevent condensation).
5. Measure Zones of Inhibition. Average 3 trials. See next page for comparisons of averages.
6. Sterilize all targets in Bunsen Burner.
7. Cleanup with disinfectant. Wash hands.

Q3: Data Analysis & Results

Table 1: Average Zone of Inhibition (mm)

SAMPLES	Trial 1	Trial 2	Trial 3	Average
Control 1 - Antibiotic	12.50	7.50	11.25	10.42
Copper Pennies	12.50	15.67	14.83	11.25
Copper BB's	8.33	7.50	9.33	8.39
Copper 110 Plate	6.67	11.67	13.33	10.56





Q4: Interpretation & Conclusions

CONCLUSIONS

Table 1 and Figure 1 and 2 shows that copper pennies had the largest (best) Zone of Inhibition, followed by Copper 110 Alloy. Since these were both better than the Zone of Inhibition of the ampicillin antibiotic, my hypothesis was accepted.