Developing an Antibacterial Wipe with Copper Species to Prevent the Growth of Escherichia coli

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Initial experiments determined the effects of metallic copper on the growth of Escherichia coli. E.coli was exposed to copper metal strips and copper powder. The fine copper powder prevented the spread of the bacteria on a nutrient agar plate while copper metal did not. The use of a smaller concentration of copper, that maintained the antibacterial properties, would be healthier and more effective. To determine the smallest concentration of copper that would produce an adverse effect on E.coli, dilutions of the soluble copper salt, Copper (II) Sulfate, were made. 10μL of solution were put on paper disks and placed in petri dishes inoculated with pGreen plasmid transformed MM294 so as to better visualize the bacteria after incubation. No rings of inhibition were present. Aqueous solutions of COpper (II) Carbonate and Copper (II) Oxide were also tested using this method and were ineffective. CuCO3 (Ksp =2.5 x 10-10) and CuO (II) Oxide (Ksp- 1 x 10-20) powders were then placed on the surface of inoculated dishes. The average rings of inhibition for CuCO3 were three times that of CuO due to its lower solubility. In order to closer replicate an antibacterial wipe, 3cm squares of felt were saturated with CuO and CuSO4 and placed on lawns of transformed MM294. They were removed after five and ten minutes and examined under a black light. The CuSO4 square that was removed after ten minutes was the most effective due to its lower Ksp level and higher concentration of active copper in solution.

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