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An Analysis of Anti-Microbial Finish on Cotton Fabric by Using Zinc Oxide

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***Abstract*: Antimicrobial finishing prevents or inhibits the growth of microorganisms or microbes. Antimicrobials do not all work the same. The vast majority of antimicrobials work by leaching or moving from the surface on which they are applied. This is the mechanism used by leaching antimicrobials to poison a microorganism. Such chemicals have been used for decades in agricultural applications with mixed results. Besides affecting durability and useful life, leaching technologies have the potential to cause a variety of other problems when used in garments. These include their negative effects because; they can contact the skin and potentially affect the normal skin bacteria, cross the skin barrier, and/or have the potential to cause rashes and other skin irritations. In this project, ZnO is mainly used for improving the anti-microbial finish. This ZnO is much cheaper than silver nitrate. The testing of the finished fabric was also carried out.**

***Keywords*: anti-microbial, zinc oxide.**

1. Introduction

The agar diffusion method (Kirby-Bauer) is a relatively quick and easily executed semi-quantitative test to determine the antibacterial activity of diffusible antimicrobial agents on treated textile material. The bacteria were grown in a nutrient broth medium. Using x100 dilution from a 3-hour culture, test organisms were swabbed over the surface of Isosensitest agar plates (Oxoid). 10 mm diameter discs of the test fabric and control fabric were then gently pressed onto the surface of the plate. The plates were incubated at 37°C for 18 - 24 hours. The antibacterial activity of fabrics was demonstrated by the diameter of the zone of inhibition in comparison to the control fabric. Images were recorded using a Protocol 2 plate counter (Synbiosis, UK). The experiment was performed in a duplicate and the mean value was taken.

2. Material and Methods

A. Materials

Zinc Oxide and D-glucose anhydrous were purchased from local chemical shop TNAU, Salem. De-starched, 100% cotton fabric (40's count) was purchased from local market, Salem.

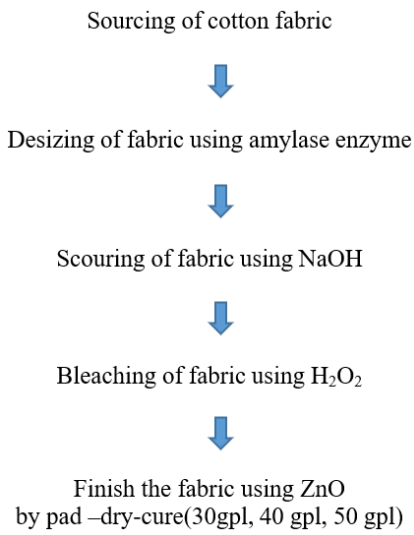

Fig. 1. Methodology

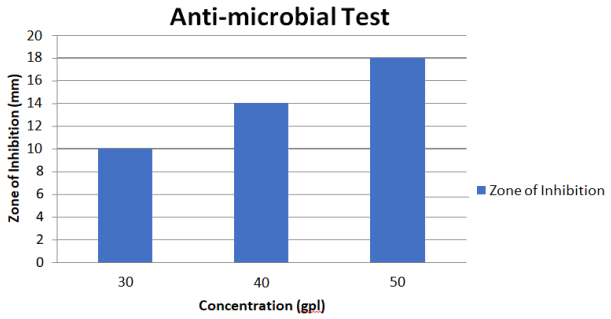

Fig. 2.

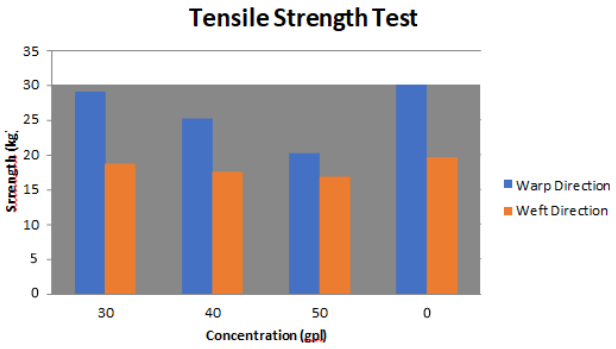

Fig. 3.

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Table 1

Sample	Concentration (gpl)	Zone of Inhibition (mm)
Sample A	30	10
Sample B	40	14
Sample C	50	18

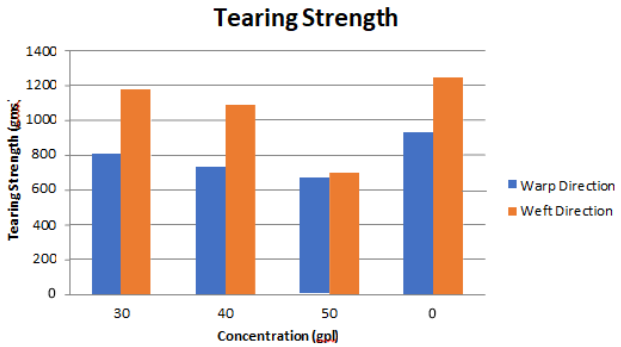

Fig. 4.

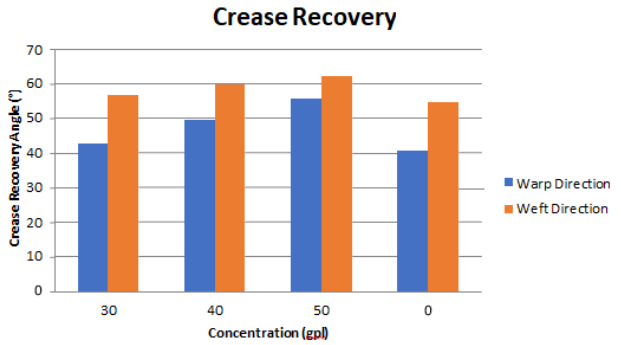

Fig. 5.

Fig. 6. Anti-Microbial activity – Concentration of 30 (gpl) Sample A, 40 (gpl) sample B, 50(gpl) sample C

Anti-microbial activity of zinc oxide from different concentration was plotted in Fig. 6. The bacteria E. Coli was sensitive to the zinc oxide prepared from three concentration are 30gpl, 40gpl and 50gpl. Compare to three concentration 50gpl has been provide more zone of inhibition. The inhibition value is 18 mm.

3. Conclusion

In this present work, we discussed the antimicrobial activities of various proportions' of ZnO-treated fabrics analyzed by the Agar diffusion method (Mucha et al., 2002). Cotton discs (10 mm) with or without the ZnO coating, were tested and the results are shown in Table 1. Figure 6 shows a clear zone of inhibition around ZnO treated fabric disc as the control fabric disc shows no sign of inhibition. The greatest inhibitory effect was observed against Escherichia coli with a zone of inhibition of 18 mm diameter.

Antimicrobial activity higher value in 50gpl which denotes an increase in the gpl value. ZnO-treated fabric to confirm a reduction in the tensile strength of the finished fabric and fabric tearing strength of the finished fabrics decreased. These fabrics will be a useful tool in hospitals as an additional weapon in the fight against hospital-acquired infections.

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