ABSTRACT

Zeolite is a porous material that can be modified as a carrier agent for antibacterial applications. This study aims to produce Ag and Cu metal-modified zeolite, determine the characterization of the material, and determine the effect of varying metal concentrations on antibacterial activity against *Escherichia coli* and *Staphylococcus aureus* bacteria. The method used involved impregnating the metals into the zeolite using $AgNO_3$ and $Cu(NO_3)_2 \cdot 3H_2O$ solutions at varying concentrations of 0.05 M, 0.1 M, 0.2 M, and 0.3 M. Material characterization was performed using FTIR, AAS, and SEM-EDX. Antibacterial testing was conducted using the well diffusion method. The results showed that the metals were successfully adsorbed onto the zeolite, but its structure remained unchanged despite modification, as indicated by the unchanged FTIR spectrum patterns. The Ag and Cu metals successfully adhered to the zeolite pores, as evidenced by AAS testing, with the highest content of 56.49% (Ag) and 14.35% (Cu) at a concentration of 0.3 M, and in the SEM-EDX test, 14.35% (Ag) and 5.06% (Cu). The highest antibacterial activity was shown by Zeo-Ag 0.3 M against S. aureus bacteria with an inhibition zone of 2.6 cm. In general, Zeo-Ag showed higher antibacterial activity compared to Zeo-Cu. This indicates that Ag-modified zeolite has greater potential as an antibacterial agent.

Keywords: Natural zeolite, Metal impregnation, Silver, Copper, Antibacterial

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