

ABSTRACT

In health and environmental fields, the utilization of metal oxide nanoparticles as effective antibacterial materials is increasing due to their outstanding antibacterial properties, one of which is the use of ZnO nanoparticles. Since metal oxide nanoparticles may pose a health risk due to their toxicity effect, metal oxide nanoparticles can be supported with a clay-like matrix (bentonite), which will form a composite as an antibacterial material. The synthesis of ZnO-bentonite composite was carried out by activating bentonite with H₂O₂. ZnO/Bentonite composites were prepared using bentonite modified with ZnSO₄·7H₂O. The successful composite was characterized by SEM-EDX and XRD to determine its structure and contents. The composite was then tested for antibacterial activity using the disk diffusion method with samples of gram-positive bacteria (*S. aureus*) and gram-negative bacteria (*E. coli*). SEM-EDX results showed that the percentage of ZnO compounds in ZnO/Bentonite composite and ZnO/Bentonite activated composite were 3.99% and 5.31%, respectively. XRD results show that the average size of ZnO nanoparticles on ZnO/Bentonite is 6.64 nm and on ZnO/Bentonite activated is 6.96 nm. The results of antibacterial activity test of ZnO/Bentonite and ZnO/Bentonite activated showed that ZnO/Bentonite had a good inhibition zone on gram-negative bacteria *E. coli* bacteria and ZnO/Bentonite activated had a good inhibition zone on gram-positive bacteria (*S. aureus*) bacteria.

Keywords: Modification, composites, ZnO/Bentonite, antibacterial activity