BIOSYNTHESIZE OF SILICA SUPPORTED SILVER NANOPARTICLES USING REDUCTOR OF SALACCA ZALACCA EXTRACT AND ITS APPLICATION AS ANTI BACTERIAL AGENTS

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ABSTRACT

The purpose of this study was to determine the effect of temperature and concentration of silver nitrate solution (AgNO3) on the preparation of silver nanoparticles through a reduction reaction process with Salacca zalacca extract on the characteristics of silver nanoparticles, and to determine the antibacterial activity of silver nanoparticles against the growth of Gram positive bacteria (*Staphylococcus epidermidis*) and Gram negative bacteria (*Escherichia coli*).
This study was divided into 3 stages, namely the preparation stage, the characterization stage and the application stage of silver nanoparticles. Silver nanoparticles were prepared using precursors of silver nitrate and reducing agent of *Salacca zalacca* extract. The preparation conditions included the concentration of silver nitrate (0.25mM; 1.25 mM; and 2 mM) and the temperature of preparation (30 ° C; 50 ° C; and 75 ° C), and incubation for 2 days. The characterization of silver nanoparticles using X-Ray Diffraction (XRD), Transmission Electron Microscopy (TEM), Fourier Transform Infrared (FTIR), and UV-Vis Spectrophotometer to determine the shape, structure, size, value of Surface Plasmon Resonance and main functional groups. The application of silver nanoparticles is intended to study the antibacterial activity against the growth of Gram positive bacteria (*Staphylococcus epidermidis*) and Gram negative bacteria (*Escherichia coli*).
The results showed that the value of Surface Plasmon Resonance silver nanoparticles was in the range of 410 nm - 460 nm with the color of brownish red silver nanoparticle colloid. XRD diffractogram shows that the structure of silver nanoparticles is face centered cubic (FCC). Based on the TEM test the size of the silver nanoparticle diameter averaged 14.2 ± 2.6 nm. The FTIR test results showed the main functional groups contained in Salacca zalacca extract were carbonyl groups and hydroxyl. Silver nanoparticles have a greater diameter zone of growth inhibition on the growth of Gram negative bacteria (*Escherichia coli*) which is equal to 9.6 mm compared to the growth of Gram positive bacteria (*Staphylococcus epidermidis*) which is 9.2 mm.

Kata Kunci: *Silver nanoparticles, Salacca zalacca, Antibacterial, Escherichia coli, Staphylococcus epidermidis.*