

**SPONTANEOUS FORMATION OF SILVER NANOPARTICLES
IN HUMIC ACID-RICH WATER OF
SANTA BARBARA, ILOILO**

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ABSTRACT

Humic acid (HA) - rich water of Sta. Barbara, Iloilo is successful in acting as a reducing and capping agent in the synthesis of silver nanoparticles (AgNPs). UV-Visible spectroscopy was used to determine the effect of irradiation time, varying HA and AgNO₃ concentration, and electrolyte addition. Furthermore, the bactericidal efficacy of AgNPs was evaluated using broth microdilution method. Measurement of AgNPs was done using transmission electron microscopy (TEM). Lower irradiation time (10-40 min) shows an increasing absorbance trend. However, absorbance decreased and showed bathochromic shifts when irradiated at longer times (50-60 min). AgNP formulations of 40 ppm HA with 4 mM AgNO₃ and 50 ppm HA with 4 mM AgNO₃ showed the highest peak intensity for varying AgNO₃ and HA concentration, respectively. These results were found in both irradiated and un-irradiated samples. Aggregation occurred upon the addition of 50 mM, 100 mM, and 500 mM NaCl but was more prominent at 500 mM NaCl. Dialyzed and un-dialyzed AgNPs have bactericidal activity. However, un-dialyzed AgNP was a more effective treatment because it showed a bactericidal activity up to 1:16 dilution for both *Staphylococcus aureus* and *Escherichia coli* as compared to the dialyzed AgNPs which showed a bactericidal activity up to 1:4 for *S. aureus* and 1:8 for *E. coli*. The dialyzed AgNPs are polydispersed but were mostly small with sizes less than 10 nm based on the TEM image.