SYNTHESIS OF CHITOSAN-SILVER NANOPARTICLES FOR COLORIMETRIC DETECTION OF Hg^{2+} AND Pb^{2+} IONS IN AQUEOUS MEDIUM

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APPROVAL AND ACCEPTANCE

The undergraduate thesis entitled **SYNTHESIS OF CHITOSAN-SILVER NANOPARTICLES FOR COLORIMETRIC DETECTION OF Hg^{2+} AND Pb^{2+} IONS IN AQUEOUS MEDIUM** prepared and submitted by **DIOLINA CHRISTINE C. OLARTE** in partial fulfillment of the requirements for the degree of **BACHELOR OF SCIENCE IN CHEMISTRY** is hereby

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SYNTHESIS OF CHITOSAN-SILVER NANOPARTICLES FOR COLORIMETRIC DETECTION OF Hg^{2+} AND Pb^{2+} IONS IN AQUEOUS MEDIUM [1]

DIOLINA CHRISTINE C. OLARTE

ABSTRACT

Background: In recent years, silver nanoparticles has been synthesized using plant extracts and polysaccharides and used for colorimetric detection of different metal ions. In this study, chitosan was used to synthesize and stabilize silver nanoparticles and were applied for the colorimetric detection of Hg^{2+} and Pb^{2+} ions. **Methods:** Chitosan-silver nanoparticles (CAgNPs) were synthesized by mixing chitosan solution, sodium hydroxide solution, and silver nitrate. The nanoparticles were characterized by UV-Visible Spectroscopy, Fourier-Transform Infrared Spectroscopy, Scanning Electron Microscopy (SEM), and Energy Dispersive X-ray Spectroscopy. Synthesized CAgNPs were used to detect Hg^{2+} and Pb^{2+} ions. Changes in absorbance and morphology of CAgNPs after the addition of metal ions were evaluated. **Results:** Chitosan-silver nanoparticles were synthesized after mixing 48 mL of chitosan solution with 150 mL of sodium hydroxide solution and 2 mL of silver nitrate solution at 30°C and pH 12.83 for 90 min. Formation of CAgNPs was confirmed using UV-Vis, FTIR and EDX Spectroscopy, and SEM. Based on the analyses, CAgNPs have average diameter size of 52.03 ± 6.72 nm. FTIR analyses of the CAgNPs showed decrease in intensity for N-H vibrations because of the attachment of silver. CAgNPs were found to be more sensitive to Pb^{2+} ions than Hg^{2+} ions. SEM images showed that CAgNPs agglomerated after the addition of metal ions. **Conclusion:** Synthesized chitosan-silver nanoparticles can be used for colorimetric detection of Hg^{2+} and Pb^{2+} ions in aqueous medium.

Keywords: chitosan, silver nanoparticles, synthesis, colorimetric detection

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