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**SILVER NANOPARTICLES SYNTHESIS AND
CHARACTERIZATION USING TURKEVICH
METHOD**

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

The synthesis of silver nanoparticles (AgNPs) has been extensively studied due to their unique optical properties and various potential applications. However, issues such as agglomeration and impurities during synthesis can affect the optical properties and hinder their functionality. One commonly used chemical reduction method for synthesizing AgNPs is the Turkevich method. In this study, AgNPs were synthesized from silver nitrate (AgNO_3) using the Turkevich method by varying the molar concentration of trisodium citrate ($\text{C}_6\text{H}_5\text{O}_7\text{Na}_3$) at 0.5 g, 1.0 g, and 1.5 g in 20 mL of distilled water. The molar concentration of AgNO_3 was kept constant at 0.034g in 100 mL of distilled water. The synthesis process was conducted at reaction temperatures of 70°C, 80°C, and 90°C, with a constant stirring speed of 900 rpm. The synthesized AgNPs were characterized using UV-Vis spectroscopy to assess their optical properties, field emission scanning electron microscopy (FESEM) was employed to analyze their surface morphology, shape, and size distribution and energy dispersive x-ray spectroscopy (EDX) used to observe the elemental composition of material. Results shows that synthesizing AgNPs at reaction temperature 90°C resulted in smaller AgNPs with more consistent optical properties. Higher stabilizer concentration while reducing the size of nanoparticles leads to aggregation due to the formation of insufficient silver nuclei. The synthesis process was carefully controlled to ensure the successful formation of AgNPs with the desired properties.

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