NANOPARTICLE SYNTHESIS FROM PINEAPPLE WASTE USING COPPER (II) SULPHATE PENTAHYDRATE

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ABSTRACT

Nanoparticles have been widely used especially metallic type as they have many potential applications that can be applied. Copper-based nanoparticles have been chosen to be synthesized by green synthesis method. Basically, green synthesis was a method that used plant extract as a reducing agent. The plant extract contain reducing properties mostly in their fruit and leaf. This green synthesizing method is easy, efficient and eco-friendly compared to chemical-mediated or microbe-mediated synthesis. Copper is highly conductive metal and less expensive compare to silver and gold also, they have excellent physical and chemical properties and also low cost of preparation. In this research project, different volume of ratio of $CuSO_4.5H_2O$ and pineapple extract; 1:2, 1:3, 1:4 and temperature at room to 80^oC were used to synthesize copper nanoparticles. The result from UV-Vis shows that the broad peak was obtained mostly around 341 to 343 nm. Plus, large amount of aqueous pineapple and high range of temperature were required to make the reduction of Cu^{2+} effectively. FTIR result shows that the stretching frequency region contains phenols and alcohol, alkyne and amide. These copper nanoparticles were in shape of spherical through observation from FESEM. Plus, the size of sample with ratio ($CuSO_4.5H_2O$: pineapple extract) 1:2 was within the range of 40-70 nm while for ratio 1:4 the size was in between 30-50 nm.

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

1.1 Background of Research

Nanotechnology is an emerging field. Nanotechnology has been chosen and evolved widely because of its big potential for well over a decade. In nanotechnology, nanoparticles that measure 100 nanometers or less in size are used. They were effectively a bridge between bulk materials and atomic or molecular structures.

Nanoparticles were known for their small size of particles. They have large surface area and this dominated the contributions made by the small bulk of the materials. The properties of nanoparticles change as their size approached the nanoscales and as the percentage of atoms at the surface of a material becomes significant. These particles have special and enhanced physical and chemical properties as compared to their bulk materials due to their large reactive and exposed surface area and quantum size effect as a result of specific electronic structures (Khan et.al, 2014). Nanoparticles also have ability to form suspensions.

Other properties of nanoparticles are quantum confinement in semiconductor particles, surface plasmon resonance in some metal particles and superparamagnetism in magnetic materials. Nanoparticles also can possess the property of diffusion especially at higher temperature and not affect the density final