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SYNTHESIS OF ZINC OXIDE NANOPARTICLE WITH BANANA PEELS EXTRACT (BPE) FROM JACKFRUIT BANANA: THE EFFECT ON PH AND REACTION TIME

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ABSTRACT

This present study is about synthesis ZnO NPs with Banana Peels Extract (BPE) from Jackfruit Banana by varying pH and reaction time. This method on producing ZnO NPs by using eco-friendly method especially biological method which are less harmful and BPE is choose as reducing agent and act as stabilizer. The samples were then characterized to identify the optimum condition found at pH 12 and 60 mins. The results Fourier Transform Infra Red (FTIR) Spectroscopy shown ZnO bonds allocate at range of 500-571 cm^{-1} for all sample, while for UV-visible (UV-vis) the band gap energy was found in between 3.34eV and 3.43eV. Furthermore, by using the X-ray Diffraction (XRD) determine the crystalline size within the range of 12.11nm to 16. 32 nm for pH. The average crystallite size at pH 12 was 14.16 nm while at 60 min was 14.16nm smallest particle size for reaction time. Brunaner-Emmet-Teller (BET) analysis shown all the samples were nanoparticles because less than 100 nm size of particle. Zeta-Potential analysis, the sample size is larger than 100nm because sample were highly agglomerates then it shows the zeta potential characterization was not successful. Lastly the High Liquid Performance was analysed to determine the presence of ZnO NPs compound in the sample was succeed in average time at 2-4min.

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TABLE OF CONTENTS

AUTHOR DECLARATION iii

SUPERVISOR'S CERTIFICATION iv

ABSTRACT vi

ACKNOWLEDGEMENT vii

TABLE OF CONTENTS viii

LIST OF TABLES x

LIST OF FIGURES xi

LIST OF ABBREVIATIONS xiii

CHAPTER ONE: INTRODUCTION 1

1.1 Research Background 1

1.2 Problem Statement 3

1.3 Objectives 3

1.4 Scope and limitation 4

CHAPTER TWO: LITERATURE REVIEW 5

2.1 Zinc Oxide Nanoparticles (ZnO NPs) 5

2.2 Synthesized of Zinc Oxide Nanoparticles (ZnO NPs) 7

2.3 Green Chemistry of ZnO NPs 8

2.3.1 Synthesis using plant extracts 9

2.4 Banana Peels Extract (BPE) 13

CHAPTER THREE: METHODOLOGY 15

3.1 Material and Chemical 15

3.2 Preparation of Banana Peels Extract 15

3.3 Synthesis of ZnO NPs 18

3.4 Characterisation of Synthesis ZnO NPs 18

3.4.1 X-ray Diffraction (XRD) 19

3.4.2 Fourier Transform Infra-Red (FTIR) Spectroscopy 20

3.4.3 UV-Visible (UV-Vis) 20

3.4.4 Brunaner-Emmet-Teller (BET) 21

CHAPTER 1

INTRODUCTION

1.1 Research Background

Nanotechnology is the innovation technology in the 21st century. The research development of nanotechnology field is rising rapidly in the world. It is also playing important roles in few fields such as pharmacology, agriculture. The continues of research about nanotechnology leading to nanoparticle base. The varies of potential technology applications of metal oxide NPs like solar cells(Nicolaev, Mitran, Iftimie, & Nemnes, 2016), photodetector(Park, Lee, So, & Chang, 2015), photocatalysis(Di, Cantarella, Nicotra, & Privitera, 2016), laser diodes(Fujita, Yanase, Nishikori, Hiragino, & Furubayashi, 2017) made nanoparticles getting more attention among researchers. (Aziz & Karim, 2019a). Additionally , its applied in including sensors, energy storage, optics, coatings and biotechnology. (Abd, Sadek, & Henini, 2018).

Zinc oxide nanoparticles (ZnO NPs) is known as important class metal oxide materials because of their extraordinary physical, chemical , electrical, biomedical, optical properties. (Abd et al., 2018). Its also exhibit interesting characteristics like good adsorption of dye in waste water treatment and high catalytic efficiency(Tian et al., 2017). Todays, most studied application of ZnO is in biosensing because have good criteria like fast electron transfer kinetics, biocompatibility and high isoelectric point (9.5). (Wahab, Ansari, Kim, Song, & Shin, 2009). Furthermore, the important role of Zn as a micronutrient in the human health over maintenance of DNA structures, proper function in immune system, its antioxidant activity has reported by previous study by the both in vivo and in vitro studies. (Salari et al., 2017). This nanoparticles revelation is new and better-quality properties with larger particles of the bulk material and properties are derivative due to the difference in specific characteristics such as distribution, size and morphology of the particles. Also, its comes out with higher surface area to volume ratio with reduction of distribution , size and morphology of