

**SYNTHESIS OF Au-CeO₂ AND ITS CATALYTIC ACTIVITY FOR
REDUCTION OF *p*-NITROPHENOL**

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ABSTRACT

SYNTHESIS OF Au-CeO₂ AND ITS CATALYTIC ACTIVITY FOR REDUCTION OF *p*-NITROPHENOL

Cerium oxides (CeO₂) possess remarkable optical properties, high thermal stability, good electrical conductivity, and diffusivity. They are widely used in sensors, absorbents, and catalytic materials. Specifically for catalysis, the CeO₂ are used as support for gold (Au) nanocatalyst to improve the stability of the gold and prevent it from agglomeration. Various methods for producing CeO₂ in form of nanoparticles has been investigated including hydrothermal, sol-gel, co-precipitation and mechanochemical. However, these methods are expensive, lengthy preparation procedures and requires the use of surfactant. Therefore, this work proposed a simple and low-cost co-precipitation method that uses cerium nitrate and potassium carbonate as precursors. This work aims to optimize the preparation of CeO₂ in terms of cerium nitrate pH and calcination temperature. Furthermore, the optimized CeO₂ were used as support for the gold catalyst (Au-CeO₂). The Au-CeO₂ was prepared by deposition and precipitation (DP) method and this catalyst was tested for the reduction of *p*-nitrophenol (*p*-NP). Characterization of CeO₂ by FTIR showed the optimized cerium nitrate pH at 6 and calcination temperature of 800 °C produced a pure CeO₂ without impurities. Moreover, the characterization of Au-CeO₂ catalyst by FTIR confirmed the immobilization of Au on CeO₂ support as the shifting from 3394 to 3412 cm⁻¹ for the O-H band and 570 to 548 cm⁻¹ for Ce-O band occurred respectively. The catalytic activity of *p*-NP reduction achieved 58.22% conversion to *p*-aminophenol (*p*-AP) with the rate constant (*k*) of 0.0359 min⁻¹. The successful reduction of *p*-nitrophenol over Au-CeO₂ catalyst proved the CeO₂ prepared by co-precipitation method is a good support for Au catalyst.

TABLE OF CONTENTS

ABSTRACT	iii
ABSTRAK	iv
ACKNOWLEDGEMENTS	v
TABLE OF CONTENTS	vi
LIST OF TABLES	viii
LIST OF FIGURES	ix
LIST OF SYMBOLS	x
LIST OF ABBREVIATIONS	xi
CHAPTER 1	1
INTRODUCTION	1
1.1 Background of study	1
1.2 Problem statement.....	2
1.3 Significance of study.....	4
1.4 Objectives of study.....	4
CHAPTER 2	5
LITERATURE REVIEW	5
2.1 Cerium Oxide, CeO ₂	5
2.2 Preparation method of CeO ₂ nanoparticles	7
2.2.1 Co-precipitation method.....	9
2.3 Effect of pH.....	9
2.4 Effect of calcination temperature	10
2.5 Surfactant	11
2.6 CeO ₂ nanoparticles' applications.....	13
2.6.1 Gas sensor	13
2.6.2 Catalyst.....	13
2.7 Gold, Au catalyst.....	14
2.7.1 CeO ₂ supported Au catalyst	15
2.7.2 TiO ₂ -titanate supported Au catalyst	16
2.7.3 Carbon nanotube supported Au catalyst.....	17
2.8 Reduction of <i>p</i> -Nitrophenol	17

CHAPTER 3	19
METHODOLOGY.....	19
3.1 Materials.....	19
3.1.1 Chemicals.....	19
3.1.2 Instrument.....	19
3.2 Experimental method	19
3.2.1 Synthesis of CeO ₂	19
3.2.2 Synthesis of Au-CeO ₂ catalyst	21
3.3 Characterization	22
3.3.1 Fourier Transform Infrared Spectroscopy (FTIR).....	22
3.4 Catalytic Reduction of <i>p</i> -Nitrophenol to <i>p</i> -Aminophenol	22
3.4.1 UV-Vis spectroscopy	22
CHAPTER 4	23
RESULTS AND DISCUSSION	23
4.1 CeO ₂	23
4.1.1 Effect of pH.....	24
4.1.2 Effect of calcination temperature	25
4.2 Au-CeO ₂ catalyst.....	27
4.3 <i>p</i> -Nitrophenol reduction	30
CHAPTER 5	35
CONCLUSION AND RECOMMENDATIONS	35
5.1 Conclusion.....	35
5.2 Recommendations	35
CITED REFERENCES	37
GANTT CHART OF RESEARCH ACTIVITIES WITH MILESTONES	47
CURRICULUM VITAE	48