

PHASE ANALYSIS OF CHROMIUM (III) OXIDE AND ALUMINIUM
OXIDE USING X-RAY DIFFRACTION

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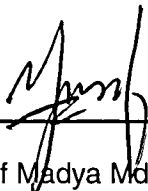
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This Final Year Project Report entitled “Phase Analysis of Chromium(III) Oxide and Aluminium Oxide using X-ray Diffraction” was submitted by Surul Huda Bt Din, in partial fulfillment of requirement for Degree of Bachelor of Science (Hons) Physics, in the Faculty of Applied Science, and was approved by



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ABSTRACT

X-Ray powder diffraction is an advanced technique primarily used for phase identification and determination of the structure of crystalline material. Cr_2O_3 and Al_2O_3 are used as samples of study in this thesis. Cr_2O_3 has been synthesized first from chromium (III) nitrate using sol-gel method while Al_2O_3 has been synthesized from aluminum acetate using same method. The samples of Cr_2O_3 then heated at 400°C for 4 hours and 700°C for 12 hours. The annealing temperature for Al_2O_3 was 1300°C for 48 hours. The samples then subjected to characterization process using X-Ray powder diffraction. The powder patterns then can be search match using X'Pert HighScorePlus software. The results showed Cr_2O_3 has higher purity and crystallinity at 700°C and Al_2O_3 pure at 1300°C .

CHAPTER 1

INTRODUCTION

1.1 Phase Analysis of transition metal compounds and metal oxide

Material is used narrowly to refer to substances or components with certain physical properties which are used as inputs to production or manufacturing. Materials are sometimes classified by the type of bonding present between the atoms.

Metals are usually in the form of solid and most atoms in solids are arranged in the crystal structure form. However, some are amorphous. This project is to analyze the phase or phases of metal and transition oxides which are Cr_2O_3 and one metal oxide which is Al_2O_3 by using X-Ray diffraction technique after the compounds are synthesized using sol-gel method. X-Ray powder diffraction is one of the most important characterization tools used in materials analysis.

1.2 Problem Statement

Chromium(III) oxide is the inorganic compound of the formula Cr_2O_3 . It is one of the principal oxides of chromium and is used as a pigment. In nature, it occurs as the rare mineral eskolaite. It is an important refractory material due to its high melting temperature (about 2300°C).