UNIVERSITI TEKNOLOGI MARA

CERAMIC WASTE PREPARATION FROM WASTE – EFFECT OF ADDITIVE

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TITLE : CERAMIC SUPPORT PREPARATION FROM WASTE : EFFECT OF ADDITIVES

CHAPTER 1 : INTRODUCTION

Introduction

Ceramic support is the most basic layer of a ceramic membrane. A ceramic membrane plays its vital roles in filtration especially. In early research, ceramic support is made up using materials such as kaolin, titania, zirconia as its starting material. As research develops later on, waste is used up as the starting material for making ceramic support. The waste used is undeniably cheap because it comes from unused materials and by using it, it can help to reduce the pollution that have been spread over to the environment. The waste that is commonly used is fly ash, glass waste, coal ash waste etc. Ceramic support preparation is often influenced by three main factors which is sintering temperature, binders and additives. In this study, we will study the effect of adding additives to the waste to prepare ceramic support. By adding additives, it is predicted that the performance of ceramic support will improvise compared to without adding the additive. The additives that are commonly used in fabrication of ceramic support is aluminium fluoride-molybdenum trioxide mixture, tungsten trioxide, vanadium (V) oxide and others to name. Later on, we will find out which additive that is most suitable to be used to synthesis ceramic support. After research and study, it is decided that ceramic support will be prepared with selection of mixture of Molybdenum Trioxide-Aluminium Fluoride as additives.

1.1 Research background

Ceramic membrane is an artificial membranes made up from inorganic materials. Such materials are alumina, titania, zirconia oxides, silicon carbide or some glassy materials. Ceramic membrane consists of dense or porous. Ceramic membrane although looks small and unimportant, actually it plays a significant roles in industries. The most notable roles of ceramic membrane are in biotechnology and pharmaceutical, dairy, food and beverages as well as chemical and petrochemical, etc.

In addition, it comes with different shapes and sizes. According to Rishi Sondhi et. al (2003), the ceramic membrane comes with various shapes and design, some of it in hexagonal and round, and with various diameters. The structure of a ceramic membrane is consisting of

porous support, modified separation layer, separation layer and modified separation layer. We are going to focus on the support which is the basic structure of a membrane.

Ceramic support is the most basic support of a ceramic membrane system. A ceramic membrane consisted of support, intermediate layer (catalyst support) and membrane layer (catalyst). Ceramic support is basically made up of substances like alumina and silica, but they are expensive. As alternative method, ceramic support can be prepared from waste. In this study we will use sanitary waste as a raw material. The parameter that will be observed in this study is the porosity and the biaxial flexural strength of the ceramic support. The hypothesis of adding additives is that it can increase the porosity of the support and also the strength. By adding different composition of the same additive, different pattern can be observed also by manipulating the sintering temperature. The three main factors showed a related relationship in making a good ceramic support.

1.2 Problem Statement

Problem statement in this is what additives that can be used to form ceramic support. Many additives such as molybdenum trioxide mixture, tungsten trioxide, vanadium (V) oxide, lanthanum oxide (La_2O_3), cerium(IV) oxide (CeO_2), boron trioxide (B_2O_3) and vanadium (V) oxide (V_2O_5) are among the additives that has been used for research for formation of ceramic support. But different additives showed unexpected different results.

Secondly is what is the effect of adding additives in the ceramic support in terms of porosity and to determine the composition of the membrane. Adding additives is expected to increase the porosity. Adding additives also changes the chemical composition of the membrane and formed certain bonds. But different composition of additive showed different results. Later in this study we will find out the best additive that can be used to be added to the waste to prepare ceramic support