CHAPTER I

INTRODUCTION

Metallosilicate is molecular sieve materials from preparation of zeolite and zeolite-like structures containing framework metal component other than aluminum and silicon exclusively. Metallosilicate catalyst are very importance for production of alkane in chemistry industrial,Light alkane in natural gas and for catalytic process of the direct conversion of methanol to aromatic hydrocarbons [1-4] especially benzene, toluene and xylene can be utilized as a booster for the high-octane-number gassoline and metallosilicate catalysts are important for using to produce raw material in petrochemical industry.

Structurally, Metallosilicate is crystal of a framework base on an extensive three-dimensional network of oxygen ion [5]. The pore structure of metallosilicate leads to various shape selectivities, of reactants, of products and of transition states. Hence, it is important to investigate the performance of catalyst having the same structure as metallosilicate for various reactions. The replacement of Al ion in ZSM-5 with various kind of metal ions would greatly modify the nature of active site [6]. Metal incorporated in metallosilicates changed the acid-property of zeolite consequently, it is expected that the catalytic performances of metallosilicate were widely changed by kind of metal [7]. A considerable number of investigations have disclosed the incorporated Fe, Ga, Zn and Al into the framwork of H-ZSM-5, Fe-silicate was effective the selectivity of catalyst for conversion of methanol to C_2 - C_4 olefins, while, H-Ga-Silicate and H-Zn-Silicate were effective for the conversion of methanol to aromatic-rich gasoline [8].

Moreover, it is well known that ZSM-5 catalysts and metallosilicate have a disadvantage in thermal and hydrothermal stability; owing to both the sintering of exchanged metal component and dislocation of the aluminum from zeolite framework [9]. Due to, metallosilicate catalyst have a disadvantage in thermal and hydrothermal stablilty.So, it is interested to investigate in the stability of metallosilicate catalyst by using crystallininty under hydrothermal treatment of each metal which loaded into metallosilicate structure.

So, the preparation metallosilicate catalyst are very importance to find the effect of type of metals in metallosilicate structure on crystallinity under hydrothermal treatment condition

In this study, the aim of this research to compare the various types of metal in metalloslilicate structure with consideration durability to hydrothermal treatment on crystallinity. Weselected metal in fourth row of the periodic table, exclusively Al, such as Zn, Fe, Ga which representation of element of group 2B, 8B and 3A respectively. Moreover, we prepared Silicalite with unloaded second metal into metallosilicate structure to compare as reference.

1.1 The objectives of this study

To study effect of type of metals in metallosilicate structure on crystallinity under hydrothemal condition

1.2 The scope of this study

1.2.1 Preparation of various metal types such as Al, Zn, Ga, Fe and unloaded metal into metallosilicate structure by rapid crystallization method.

1.2.2 Pretreatment of catalyst using hydrothermal treatment condition at 600°c with 10 mole% water for 24 hr.

1.2.3 Characterization of catalysts by following method :

a) Structure and crystallinity of catalysts by X-ray diffractormeter (XRD)
b) Morphology of catalyst by Scaning Electron Microscopy (SEM)
c) Qualitative analysis of substance in catalysts by X-ray Fluorescence analysis (XRF)
d) Qualitative analysis of Si and metal structure in framework by ^{29}Si MAS NMR
e) Qualitative analysis of Al in framework by ^{27}Al MAS NMR
f) TPD (NH_3) curve of metallosilicate catalysts
g) Specie characterization of metallosilicate by FT-IR.
h) FT-Raman Spectroscopy of metallosilicate catalysts.