CHAPTER I

INTRODUCTION

1.1 Motivations

The need of electrical power requires adequate supply of power stations. Although there is various renewable energy sources that do not encounter environmental problems [Hui and Chao, 2006] a number of the power stations in Thailand are still fed by fossil fuels. Coal is one of the major fossil fuels used in local power stations. In the production of electricity, coal are pulverized to powder form and blown into a furnace by high velocity hot air. The pulverized coal is burnt at a temperature higher than melting points of most minerals which is resided within the coal, causing the transformation of physical and chemical properties of such minerals. Some light minerals are not undergone reactions and are remained in the exhaust gas, and this is called fly ash. The amount of fly ash depends on the mineral matter content of coal.

Fly ash is composed of Si and Al as the major elements [Rayalu et al, 2001] (in the form of aluminosilicate) and minor amount of Fe, Na, K, Ca, P, Ti, and S. Other crystalline minerals are also present in small quantities such as mullite, quartz and lime anhydrite.

At present, many technologies have been developed for the disposal of fly ash such as the usage as raw material substitute in cement production. As the major components in fly ash are amorphous aluminosilicate glasses (about 80 %)[Molina and poole, 2004], the conversion of fly ash to zeolite has been proposed as a viable method. This is not only to generate a useful adsorbent but also to increase the value of fly ash.

In this work, the synthesis zeolite from fly ash by fusion method using NaOH as the activation reagent is investigated. Several fabricating factors that could have strong effects on the properties of the zeolite product are examined, such as the ratio between NaOH and fly ash, time and temperature for the fusion process.

1.2 Objective of this work

The objective of this work is find suitable condition for the synthesis of zeolite from coal fly ash using the fusion method. This includes the determination of the ratio

of NaOH to fly ash before the activation, and conditions of the fusion process including fusion time and temperature

1.3 Scopes of this study

This work is carried out based on the following scopes:

-The NaOH/fly ash ratio of concern is in the range of 0.5-3 g/g.

-The Si/Al mole ratio range from 2-5

-The range of fusion temperature is 250-550 °C whereas the fusion time is 15-60 min

-The volume of distilled water is 65, 85, and 115 ml

-The mixing temperature of aging is range of 30-90°C and the times of aging are between 6- 48 h.

-The temperature of crystallization is ranged from 30-90°C and times of crystallization are 1-3 h.