CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDIES

Concrete is one of the oldest manufactured construction material used in construction of various structures globally until today. Concrete is a material where mixture by cement, water, and aggregate (fine and coarse) which must be workable, resistance to freezing, chemicals resistance, low permeability, wear resistance and economy (Metha et al., 2006). It is must environmental friendly construction materials with offer the stability and flexibility in designing all building structures.

However, the uses of these waste material products like fly ash, rice hull ash and silica fume is not only one of the solutions to the environmental and ecological problems. Some of this product also already shown a very effectively in improving the concrete microstructure and consequently achieved the durability properties of concrete by use the pure Portland cement (Galau et al., 1996)

Nowadays, the use of recycled materials as concrete ingredients is gaining popularity and development because of increasingly stringent environmental legislation. Furthermore, there is significant research on many different materials for cement usage substitutes and replacement such as palm oil fuel ash (POFA), pulverize fuel ash (PFA)
and many others fibre and pozzolanic material. Since Malaysia is second largest producer in palm oil industry, the wastage of the palm oil can be used to replace in small amount of cement.

This industries produce waste from burning palm oil shell and husk that namely as POFA. POFA is one of waste that can be used as fillers or pozzolanic or replacement for cement in concrete. According to (Tangchirapat et al., 2009) POFA is one of agro waste ashes whose chemical composition contains a large amount of silica and high potential materials that can be used as a cement replacement. There are many experimental works that conducted by introducing recycled material likes palm oil fuel ash (POFA) as a replacement of cement with different percentage to improve the properties of concrete.

POFA is produced by the palm oil industry due to the burning of EFB, fibre and OPS as fuel to generate electricity and the waste, collected as ash to become POFA. About 3 million tons of POFA was produced in Malaysia at 2007 and 100,000 tons of POFA is produced annually in Thailand. In Thailand, POFA is produced from a biomass power and this by-product is still disposed of as waste in landfills. Due to the increasing disposal costs, the utilization of POFA is an important issue for the industry and the public to landfills environmental problems.

1.2 PROBLEM STATEMENTS

Generally, the waste of palm oil from the palm oil industries was increasing eventually. It is become a major problem to palm oil power plants because this wastage from palm oil are not reused and recycle in any works in order to utilize these waste materials as an active pozzolanic admixture. These pozzolanic admixtures are used for reducing the Portland cement content in mortar and concrete production. Many studies have been emphasized that the positive effects exerted by such pozzolanic admixtures on properties of Portland cement mortar and concrete. Besides that, when the
admixtures is added is also could improve the sulphate resistance of the Portland cement mortar and concrete. However, what can be expected in a specific situation will depend on the mineralogical and chemical composition of the mineral admixture.

Therefore, the excess industrial ashes remain to disposed of in landfills which cause the environmental problems. The carbon dioxide emission from the production process can give greenhouse effect to the worldwide. So that, treated POFA on pozzolanic activity and microstructure can lead to be useful in protecting the environment by minimizing the volume waste disposed on the wasteland.

It is important to do research on the effect of POFA with the new replacement of cement materials that can reduce the amount of cement in the construction project. However, in general this research is very important in order to know whether the POFA concrete with lime added will produce a higher strength and higher workability of concrete towards concrete hydration and concrete microstructure.

1.3 OBJECTIVE OF STUDY

The objectives of the study are:

a) To investigate the effect of palm oil fuel ash (POFA) with limestone towards concrete hydration.

b) To investigate the effect of palm oil fuel ash (POFA) with limestone towards concrete microstructure.