

UNIVERSITI TEKNOLOGI MARA

RECOVERY OF CENOPHERE FROM FLY ASH

NUR AIN BINTI SUMARI

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ABSTRACT

All power plants that are generating electricity from coal must have abandoned huge much amount of fly ash per day. The combustion residual disposed without any recovery could lead to environmental concern due to the high contents of metals. Certainly can be harmful and much like degrades the quality of land. Previous research has found that the fly ash content cenospheres which can be utilized to several of applications such as plastics, construction and recreation.

From this project, fly ash sample obtained from Kapar Power Plant was investigated to identify the amount of cenosphere composition. Nowadays, cenospheres is part of the marketable sources for construction field such as making cement. They are in hollow spheres and can be obtained about less than 2 % of the fly ash sample.

The purposes of this project are recovery of cenosphere from fly ash by using one of wet separation method which is float sink test. The main parameter concerned by this separation is the density. This test yields about 2% equals to 0.3 g an amount of cenosphere due to the density that is less than 1 g/cm³. Portion of recovered cenosphere and fly ash were analysed in term of their composition, properties, different sizes and characteristic by using three types of instruments which are X-ray diffraction and particle size analyser.

From both tests, the mineral composition present in cenosphere is quartz, mullite and calcite and the particle size distribution of cenosphere is slightly higher distribution than fly ash. Throughout the process, there are some justification can be made between the properties of fly ash and recovered cenosphere of the same sample fly ash.

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CHAPTER 1

INTRODUCTION

1.1 Research Background

Nowadays, power plants have enlarged all over the world and using coals as their sources of fuel instead of gas. Instead of decreasing the cost of raw materials, it tends to increase a production of plant. Coals are composed of combustible organic matter with a variable amount of inorganic mineral matter. This can be proved as billion metric tons of coal mined annually in the United States which estimated about 90% is used for combustion in order to obtain energy that can generate electricity (Barbara and Ann, 2009).

Instead of contributing to raising the economy of a country, waste gives a side impact to environment if it is not managed properly. In 2008, United States produced about 136.1 million tons of coal combustion residues. Ward (2010) claimed that 44.5% of the residues were utilized in beneficial manner and the remaining just being disposed in ash pond. Coal combustion residue consists of two by product which are fly ash and bottom ash. Fly ash is constituted as the huge quantity production which urges significant pressure towards environment as well as waste management system. Rather than risking the landfill to be occupied by residue to some extent, exploitation on the fly ash by discrete useful components may add some value to fly ash as raw materials.

One of the valuable content inside fly ash is cenospheres. The word cenosphere started from Greek by words of 'Kenon Sphaira' that is defined as hollow spheres (Kruger and Toit, 1991). It is lightweight, mostly occupied by air or gases and hollow ceramic and acts as vital value added inside fly ash. Generally, coal