

UNIVERSITI TEKNOLOGI MARA

**PHYSICAL, CHEMICAL AND
MINERALOGICAL PROPERTIES OF
FLY ASH AND BOTTOM ASH**

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ABSTRACT

The purpose of this study is to investigate the physical, chemical and mineralogical properties of fly ash and bottom ash taken from the Stesen Janakuasa Elektrik Sultan Abdul Aziz Shah, Kapar, Selangor. The unused fly ash and bottom ash is one of the major problems of all combustion power plants in Malaysia and it brings significant problems to the environment such as the air pollution and groundwater contamination. This research has identified certain suitable features that exist in fly ash and bottom ash that will enhance the potential of application in the industries. The equipments used in this research were X-ray Fluorescence which to analyse chemical composition of the ashes, X-ray Diffraction to analyse mineralogical characteristics and Particle Size Analyzer to identify particle size distribution. Both fly ash and bottom ash has similar composition. However the slight differences in composition is what makes these two ashes differ from each other. Fly ash and bottom ash consist mostly of silicon dioxide. However bottom ash has more amount of magnesium oxide compared to fly ash. X-ray diffraction shows that both sample has high intensity of crystallinity structure. Size distribution results shown that 50% of the diameter particles in the fly ash are larger than 26.227 μm meanwhile the other 50% smaller than 26.227 μm . Meanwhile 10% of the bottom ash has diameter less than 18.078 μm and 90% of it has diameter less than 161.071 μm .

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CHAPTER 1

INTRODUCTION

1.1 Research Background

Coal predominantly consist of carbon and hydrogen, however coal still contains mineral materials such as clays, shales, quartz and calcite. The percentage of minerals possessed by the coal varies by its type and source taken. After the process of incineration takes place, coal ash can be collected along with some of the unburned carbon during the incineration. Combustion with a high level of temperatures and pressures generates by-products which are known as ash (Ismail *et al.*, 2007). The ash itself can be divided into two categories which are fly ash and bottom ash. The amount of both fly ash and bottom ash produced depends on the combustion condition, amount of mineral matter existing in the coal and volume of coal being burnt at the power plant itself. Fly ash and bottom ash have totally different characteristics, however they are both composed of amorphous and glassy aluminosilicates materials.