A STUDY ON THE EFFECT OF USING DIFFERENT TYPE OF ORGANIC ACID ON THE PRE-TREATMENT OF EXTRACTION SILICA FROM RICE HUSK ASH (RHA)

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ABSTRACT

Rice husk is an abundant agricultural by-product, which contain high amount of silica which is about 60% and can be made into raw materials that can produce silica gel and powders. There are abundant uses of silica which are for the glass production, adsorbent, cleansing agent and others. Synthesis was done by using different acids namely, acetic acid, citric acid, and formic acid. The sample was collected from rice mill that located in Sabah. The proximate analysis of the sample was determined the moisture content, volatile matter, fixed carbon and ash by using the thermobalance TGA/SDRA51e according to ASTM D5142-02a. Rice husks were used in this research and were carbonized at 600 ˚C for four hours to decrease the carbonaceous materials in the rice husk therefore increasing the amount of silicon dioxide (SiO_2). 10 grams each of carbonized rice husk sample were dispersed in 6M of acetic acid, oxalic acid and formic acid respectively for acid pre-treatment and this dispersion were being stirred for 2 hours using magnetic stirrer. The filtrate is then being dispersed in 1M of NaOH to produce sodium silicate before being titrated using 1M of hydrochloric acid. At the pH of 7, silica gel was produced and being dried in oven at 140 ˚C for 8 hours before being weigh. The percentage of the silica being extracted were being compared to the previous research. The characterization of the silica obtained determined by the Fourier Transform Infrared Spectrograph (FTIR) and BET surface area instrument.

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CHAPTER 1

INTRODUCTION

1.1 RESEARCH BACKGROUND

Rice husk are the hard component that covering the grains of rice and the ash from rice husk is able to be one of the source of amorphous reactive silica which can be applied in many applications in component science. The Silicon dioxide (SiO_2) which is also known as Silica can be applied in many industries for the production of Portland cement (Flörke et al., 2008), production of glass for windows, drinking glasses, beverage bottles, optical fibers for telecommunication and so much more.

Rice husk can be generated through rice milling industry. The rice husk is the by-product which contributes about 23% from its initial weight (Della, Kühn, & Hotza, 2002). Rice husk can be utilized as a source of biomass energy and it is also an important agricultural residue (Han et al., 2008). If the rice husk ash is not deployed, it will cause large waste generation, energy loss and environmental problems (Selvakumar et al., 2014). In Malaysia, the total rice consumers that was recorded in 2007 is about 27.17 millions (Wong et al., 2014) and it is still increasing as the total population in Malaysia still rising. From the statistic, it shows that the production rice husks are still considered high in Malaysia.

Rice husk application as a fuel is in heat generation for drying rice will produce rice husk ash through combustion. The burning of rice husk will yield silica ash, which can be identified in different type of colors depending on the inorganic impurities and the amount of unburned carbon (Della et al., 2002). The exceptional