UNIVERSITI TEKNOLOGI MARA

EFFECT OF ACID CONCENTRATION ON EXTRACTION OF SILICA FROM RICE HUSK, RICE HUSK ASH AND IMPERATA CYLINDRICA VIA ACID LEACHING TREATMENT

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AUTHOR'S DECLARATION

I declare that the work in this thesis is carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

Rice Husk and Imperata cylindrical (Cl) are natural agriculture waste and abundantly waste that can be used as an effectively resources for production of silica (SiO_2). Silica can be apply as an additive for the manufacture of plastics and rubber; as a strengthening filler for concrete and other construction composites. The purpose of this study is to find an alternative way to extract the silica from the natural fibres which are Rice Husk and Imperata cylindrica via acid leaching treatment, due to silica as a raw material that can be contribute in industrial. Acid leaching treatment are carried out to extract the silica and remove metallic impurities in Rice Husk and Imperata cylindrica. Besides, the parameters such as concentration of acids and leaching time using organic and inorganic acid leaching method are also analysed. In this research, the extraction of silica from RH and Imperata cylindrica are done via acid leaching treatment using organic and inorganic reagent known as hydrochloric acid (HCL) and citric acid ($C_6H_8O_7$). The scope of this research are to analyse the effect of acid treatment, the effect of extraction on stirring time and different solvent used to the yield of silica produced. The performance of this research is covered on several testing which are scanning electron microscopy (SEM)/Energy Dispersive X-ray (EDX) analysis, X-ray diffraction (XRD) spectroscopy analysis and Thermogravimetric Analysis (TGA) and for mechanical properties are Impact testing (ASTM D256) and Tapped Density (ASTM D7481-09) to analyse the samples. As a conclusion, results proved that silica can be extracted from all natural fibres uses; RH and Imperata cylindrica using concentration of 1.0 M of HCL acid at 90 minutes of stirring time compared with 0.1 M and 0.5 M. The purity of silica extracted for RH is more than 90% however for Imperata cylindrica is more than 80%. All test and analysis results showed that 1.0 M of treated RHA has the highest purity of silica content, crystalline in phase, highest thermal stability, and impact strength and density rather than RH and Imperata cylindrica.

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TABLE OF CONTENTS