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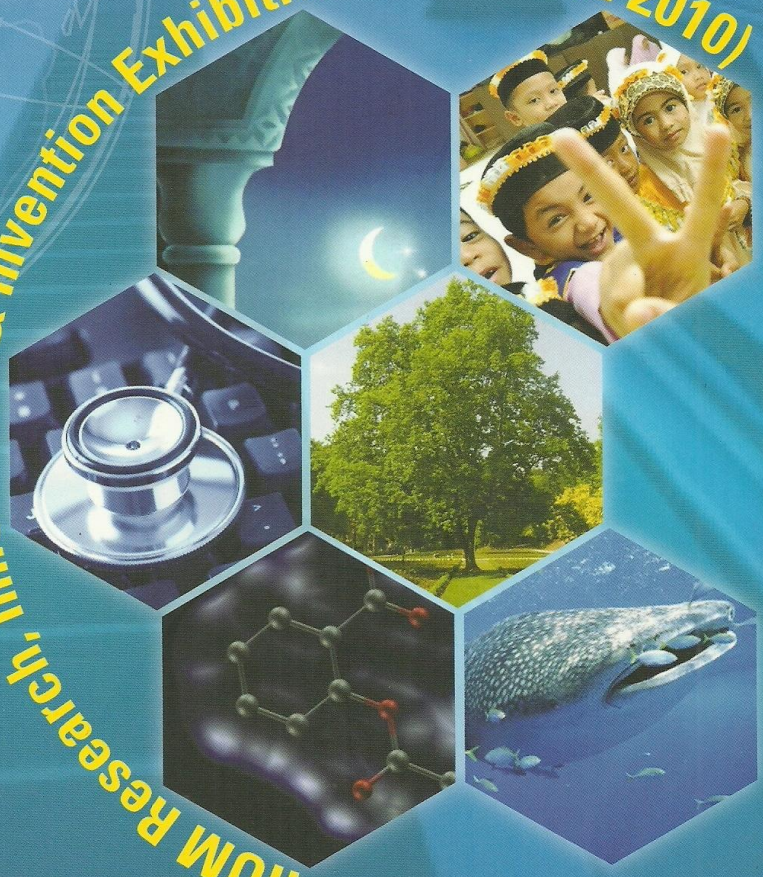

ENHANCING QUALITY RESEARCH & INNOVATION for SOCIETAL DEVELOPMENT

PP-185 Production of Activated Carbon From (EFB) for Removal of Cadmium

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In this work, various activated carbons have been prepared by steam activation from oil palm empty fruit bunches to study the effect of activation temperature, activation time and steam flow rate. Series of batch laboratory experiments were conducted in order to investigate the feasibility of activated carbon – derived from oil palm empty fruit bunches to find the suitability of its application for the removal of heavy metal (cadmium) from aqueous solution through the adsorption process. Assessment was carried out by studying the influence of removal of Cadmium, pH, adsorbent dosage and agitation rate to select the optimum best production conditions using a 2-level full factorial experimental design for PACs produced. The thermal activation at 600, 750 and 900°C with steam flow rates (2.0, 3.0, 4.0 mL/min), and contact time at 15, 30 and 45 minutes was used for the production of activated carbons. Based on the analysis of variance (ANOVA) and batch adsorption test, the results indicated that activated carbon derived from 900°C, steam flow rate- 2ml/min and activation time- 15min has maximum adsorption capacity at 2minutes (0.273 mg/g) for the removal of cadmium (97.2%), R^2 =0.999 in the aqueous solutions which showed good quality adsorbent with a yield of 17.21% and correlation coefficient R 2 = 0.992. The optimum conditions for PACs produced were investigated through an adsorption tests on aqueous solution of cadmium in which was used for comparative studies on the adsorption isotherms (Langmuir and Freundlich) to evaluate or predict the adsorption characteristics of the optimum activated carbon produced. Batch adsorption studies showed that equilibrium time of 2minutes was needed for the adsorption of cadmium on the activated carbon during experiment. The regression coefficient (R^2) showed that Langmuir isotherm (R^2= 0.984) fits the result better than Freundlich isotherms (R^2= 0.950). The characterization of PACs produced was measured to evaluate its high quality. The result of this study demonstrated that activation temperature of 900OC had the most significant effect on the adsorption characteristics as well as yield of the activated carbon produced.

PP-189 A Novel Process Development for Production of Phenolic Acids with High Scavenging Activity from Palm Oil Mill Effluent

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The present investigation is an effort to develop an environmentally sound and cost effective liquid-state fermentation process by introducing a novel strain of *Aspergillus niger* which was isolated locally for the production of phenolics from palm oil mill effluent (POME). The selection of the potential fungal strain showed that IBS-103ZA (IMI 385267) strain gave the highest total phenolic content (639.90 ± 4.19 GAE mg/l) after 72 hours of fermentation at fixed media and process conditions. To enhance the production of phenolic compounds, a study based on statistical design was employed. A two-level Plackett-Burman design was applied where 11 variables consisted of various media components and process conditions were studied for their influence on phenolics production. Out of 11 variables, sucrose, manganese sulfate ($MnSO_4$), and temperature were identified as the most significant variables in improving phenolics production by IBS-103ZA strain. Response surface methodology (RSM) was used to improve the phenolics production. Face-centered-composite-design (FCCD) helped in increasing the total phenolic content significantly from 856.09 ± 2.22 to 940.80 ± 3.72 GAE mg/l. The optimum conditions were found to be at 6.0% (w/v) sucrose, 2.5% (w/v) $MnSO_4$, and temperature of 35.0 °C with other fixed parameters. The antioxidant activity was measured using 2,2-diphenyl-1-picrylhydrazyl (DPPH) scavenging assay and compared with Butylated hydroxytoluene (BHT). The fermented extract with IC_{50} value of 0.45 mg/ml, has strongest antioxidant potency compared to unfermented extract (IC_{50}: 1.13 mg/ml) and the reference compound, BHT (IC_{50}: 0.63 mg/ml). The phenolic compounds (with promising