

**STUDIES ON THE USES OF LOCAL UNBURNED
CARBON AS ENVIRONMENTAL FRIENDLY
SORBENT MATERIAL**

PhD (DISSERTATION)

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ABSTRACT

Unburned carbon, a product of No(1) Iron and Steel plant, Pyin Oo Lwin and generated unburned carbon from Samlaung coal mine were studied, with regards to the uptake of toxic metal as well as decolourization nature of dye and antibacterial activity. An experimental yield percent (48%) of Samlaung unburned carbon was achieved. The unburned carbons were analysed by conventional and modern techniques. It was found, Pyin Oo Lwin unburned carbon contains 46.31(C%), 1.6(S%), 2.73(H%), 1.04(N%), and that of Samlaung unburned carbon contains 21.43(C%), 0.76(S%), 1.48(H%), 0.42(N%). Modern techniques to characterize the unburned carbon consist of XRD, TGDTA, FTIR and SEM. The mesoporous (>100nm) nature of unburned carbon was found to be the determining feature of the unburned carbon. Comparatively, with regards to decolourization of dye, the PUC showed higher decolourization character with (N_m) 0.8640 mg g⁻¹ for removal of 0.1% methylene blue color. Similarly, in the uptake of metal ions (Cu²⁺, Ni²⁺ and Hg²⁺) by the break-through capacity method, PUC sample shows 127.08 mg for uptake of Cu²⁺, 88.04 mg for Ni²⁺ and 501.18 mg for Hg²⁺ for 1g of loaded PUC sample. SUC sample shows lower uptake of Cu²⁺ (95.31mg), Ni²⁺ (58.69 mg) and Hg²⁺ (401.47 mg) for 1g of loaded SUC sample. Comparatively, the CAC which is actually chemically activated carbon shows much lower uptake of the metal ions that is Cu²⁺ (63.54mg), Hg²⁺ (300.88 mg) and on the average Ni²⁺ (58.69 mg) for 1g of loaded CAC sample. The break-through capacity, sorption method showed the uptake of metal ions in the order of Hg²⁺>Cu²⁺>Ni²⁺ and with respect to the samples PUC>>SUC>CAC. Antibacterial test by the other diffusion method showed that in terms of countable number of bacteria; the samples PUC>SUC>CAC. The results of investigation showed that unburned carbon can be used as environmental friendly sorbent materials for sorption of organic dyes such as methylene blue and congo red solution, adsorption and removal of heavy metal ions such as Cu²⁺, Ni²⁺, Hg²⁺ and reduction of E.Coli bacteria from the environment.

Keywords : *unburned carbons, break-through capacity for copper, nickel and mercury adsorption*