



The 3rd International Conference on Green Chemical Engineering Technology
(3rd GCET_2017): Materials Science

Microwave induced HNO₂ and H₃PO₄ activation of oil palm frond (OPF) for removal of malachite green

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Abstract

The use of abundantly available and eco-friendly adsorbent oil palm frond (OPF) has been reported as an alternative to the current expensive methods of removing of malachite green (MG) dyes from an aqueous solution. The effects of pre-treatment (microwave activated with HNO₃ / H₃PO₄) was investigated. The adsorption of MG on OPF was confirmed by FTIR, as it showed the change in characterization before and after adsorption. It was found that strong interaction between OPF surface and MG was observed as similar to characteristic peaks of MG which also presence at OPF spectra after reaction. These results provide a strong evidence for the adsorption of MG onto the OPF surface. In this study, the use of 1 g/L of 300W N-OPF resulted in the nearly complete removal of 10 ppm of MG with a maximum removal at 93.6% after 15 min of contact time at pH 5 and 303 K. The results indicated that the OPF can be used effectively to remove MG from aqueous media.

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Selection and/or Peer-review under responsibility of The 3rd International Conference on Green Chemical Engineering and Technology (3rd GCET): Materials Science, 07-08 November 2017.

Keywords: Oil palm frond (OPF); malachite green (MG); microwave; adsorption; HNO₃; H₃PO₄

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