

**CURRENT RESEARCH
AND DEVELOPMENT IN
BIOTECHNOLOGY
ENGINEERING
AT IIUM**

VOLUME I

Editors:

Suleyman Aremu Muyibi
Mohammed Saedi Jami
Zaki Zainudin



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(VOLUME I)

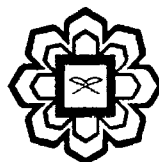
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MEMBRANE PROCESS FOR REUSE OF TREATED PALM OIL MILL EFFLUENT (POME)

Mohammed Saedi Jami, Suleyman Aremu Muyibi, Siti Noor Hayati Abdul Kudus and Munirat Idris Oseni

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ABSTRACT

In this study, membrane ultrafiltration is used as a treatment method to treat the treated POME so the treated water can be recycled back as boiler feed water. Several pretreatment processes were exercised before ultrafiltration process was carried out including coagulation-flocculation using ferric chloride (FeCl_3) as coagulant, adsorption using powdered activated carbon (PAC) and microfiltration. The optimum contact time and PAC dosage were determined for adsorption process. The effect of MWCO and transmembrane pressure (TMP) were investigated. The results of adsorption process showed that 5 g of PAC was able to reduce total suspended solid (TSS) up to 99.78% when it was in contact with 100 ml of sample for 90 minutes. For membrane ultrafiltration, the best MWCO and TMP were 10 kDa and 1.0 bar where at these conditions, the reduction was up to 99.34%, 99.96%, 97.22 and 100% for TDS, TSS, Fe and Cu, respectively. The quality of permeate was compared to standards.

Keywords: palm oil mill effluent, membrane, pretreatment, ultrafiltration, transmembrane pressure.

INTRODUCTION

Raw POME is a colloidal suspension containing 95-96% water, 0.6-0.7% oil and 4-5% total solids including 2-4% suspended solids (Ahmad et al., 2003). If not treated properly, it creates a serious threat to the environment and sources of potable water. Membrane technology is found to be very useful in POME treatment. Before treating POME with membrane technology, pretreatment is required because POME contains very high suspended solids that will cause membrane fouling that will reduce the efficiency of operation if being subjected with raw POME. So, pretreatment process is carried out to reduce these high contents of suspended solids and also residual oil in the raw POME. The choice of pretreatment techniques depends on the objectives of the treatment.

Despite having many advantages, membrane technology also has its drawbacks. The major problem of this technology is membrane fouling (Wu et al., 2007). POME contains considerable amount of protein and this eventually lead to membrane fouling. The mechanisms that lead to membrane fouling are gel layer formation, adsorption and pore