CURRENT RESEARCH AND DEVELOPMENT IN BIOTECHNOLOGY ENGINEERING AT IIUM

VOLUME III

Editors:

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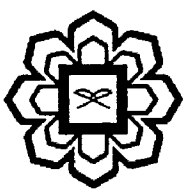

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COMPARATIVE STUDY OF BIOREACTORS USED FOR PALM OIL MILL EFFLUENT TREATMENT BASED ON CHEMICAL OXYGEN REMOVAL EFFICIENCIES

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ABSTRACT

The conventional treatment method for palm oil mill effluents (POME) is predominantly anaerobic system, which involves the use of various bioreactors. Some of these bioreactors have been studied for the treatment of POME at laboratory scale, though few have been applied industrially. Such bioreactors include up-flow anaerobic sludge blanket (UASB) reactor, up-flow anaerobic filtration, fluidized bed reactor, up-flow anaerobic sludge fixed-film (UASFF) reactor, anaerobic contact digester, continuous stirred tank reactor (CSTR) and membrane bioreactors. Few studies on the application of bioreactors based aerobic activated sludge reactor and evaporation method have been reported. Chemical oxygen demand (COD) is the parameter that measures the level of pollutants in wastewater, thus, this mini-review compares the various bioreactors, employ in the treatment of POME, based on their chemical oxygen demand (COD) removal efficiencies and thus envisages feasibility of introducing novel bioreactor for effective treatment of POME.

Keywords: Anaerobic, Aerobic, Bioreactors, Chemical Oxygen Demand,

INTRODUCTION

POME as a Source of Wastewater

Fresh palm oil mill effluent (POME) is characteristically a thick brownish colloidal containing a mixture of water, oil and suspended solids. It is however, non-toxic, since chemicals are added to the extraction process (Khalid andWan Mustafa, 1992; Ma et al., 1993), but it is slightly acidic (pH $\approx$ 4.5) due to the presence of organic acids (Md Din et al., 2006). Table 5 shows the general characteristics of raw POME (Wood et al., 1979; Wong et al., 2009a). The suspended solids, which are organic in nature, constitute about 50% of the POME (Ho and Tan, 1983), (Ho et al., 1984). A typical characteristic of POME is given in Table 1.