

## **Statistical optimization of biohydrogen production from palm oil mill effluent by natural microflora.**

### **ABSTRACT**

In this study, palm oil mill effluent (POME) was used as the substrate for biohydrogen production. Heat-treated POME sludge acclimated with POME incubated at 37°C for 24 hours was used as seed culture. Preliminary screening on the effects of inocula sizes, heat treatment, substrate concentration and pH of incubation by using a factorial design (FD) were conducted under mesophilic condition (37°C) using a serum vial (160 mL). The experimental results from two-level FD showed that pH and Chemical Oxygen Demand (COD) of POME significantly affected biohydrogen production. Optimizations of the specific hydrogen production ( $P_s$ ) and the hydrogen production rate ( $R_m$ ) were achieved by using a central composite design (CCD). The maximum  $P_s$  of 272 mL H<sub>2</sub>/g carbohydrate was obtained under optimum conditions of pH 5.75 and substrate concentration of 80 g/L. The maximum  $R_m$  of 98 mL H<sub>2</sub>/h was calculated under the optimum conditions of pH 5.98 and substrate concentration of 80 g/L. The optimized conditions obtained were subjected to a confirmation run and it showed reproducible data with a  $P_s$  of 226 mL H<sub>2</sub>/g carbohydrate and  $R_m$  of 72 mL H<sub>2</sub>/h.

**Keyword:** Palm oil mill effluent; Biohydrogen; Central composite design.