

## **The effect of hydraulic retention time and volatile fatty acids on biohydrogen production from palm oil mill effluent under non-sterile condition**

### **ABSTRACT**

The effect of hydraulic retention time and volatile fatty acids produced during fermentation were investigated on biohydrogen production from palm oil mill effluent in a 50 L bioreactor. The fermentation was done in three different hydraulic retention times; HRT 5, HRT 3 and HRT 2 days. Hydraulic retention time and volatile fatty acids concentration showed a vital role in response to the biohydrogen concentration, biohydrogen rate and biohydrogen yield. The maximum biohydrogen concentration was obtained at HRT 2 days with 30% hydrogen content in biogas. The biohydrogen yield and rate were 1054 NmL/L-POME and 44 NmL/h/L-POME, respectively. The lowest biohydrogen yield and rate were observed at HRT 5 days with 557 NmL/L-POME and 5 NmL/h/L-POME, respectively. Meanwhile, the accumulation of propionic acid concentration up to 7 g/L was suggested as a factor that reduced the biohydrogen production.

**Keyword:** Biohydrogen; Palm oil mill effluent; Hydraulic retention times; Volatile fatty acids