THE EFFECT OF GLUCOSE ADDITION AS CO-SUBSTRATE ON DIESEL OIL WASTEWATER TREATMENT USING HIGH RATE ALGAE REACTOR (HRAR) SYSTEM

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ABSTRACT

Oil content in wastewater are generally difficult to be degraded by microorganism using biological waste water treatment. High Rate Algae Reactor (HRAR) has been developed and widely used as domestic and industrial wastewater treatment. Algae in HRAR system is attempted to be applied in wastewater treatment containing diesel oil. The research was conducted to assess HRAR ability on removing diesel oil by the addition of glucose as co-substrate. Addition of co-substrate is estimated to stimulate bacteria to provide carbon dioxide for microalgae.

This research was conducted using 8 reactors with concentration of diesel oil in wastewater and concentration of sugar added as variable. Variations of sugar added were 5 grams, 7 grams, and 10 grams into 18 Liters of water in the reactor. Variations of diesel oil concentration were noted from preliminary research. Preliminary research was conducted using 4 variations of diesel oil concentration and 1 control reactor. From the 4 types of concentration, only 2 were used which can be tolerated by algae to be used in this research. The concentration of diesel oil were 381 ppm and 830 ppm. Each parameter were analyzed once every two days for 14 days. The parameters analyzed in this research was oil & grease, COD, chlorophyll a, DO, pH, temperature, and MLSS.
The result showed the highest efficiency of diesel fuel removal was 84.27%. This highest efficiency was obtained from reactor with diesel oil concentration 830 ppm and 10 grams of sugar in 18 Liters water with COD concentration 586.67 mg/L. On diesel oil concentration 830 ppm, addition of co-substrate had given an effect. The more co-substrate added, the higher efficiency of diesel oil removal can be obtained.

Keywords: algae, glucose, HRAR, diesel, substrate