GROWTH OF AN OIL OXIDIZING BACTERIUM (NAP C) ON PHENANTHRENE

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ABSTRAK

Nap C adalah sejenis bacteria pengurai minyak yang diperolehi dari sedimen perairan persisiran laut Port Dickson. Ia adalah bacteria gram negatif dan menghasilkan spore dalam keadaan tidak menggalakkan. Keadaan persekitaran optimum untuk pertumbuhan Nap C pada phenanthrene adalah pH 8, saliniti 30 g/l dan suhu 30 °C. Selain itu, yeast extract sebanyak 40 mg/l diperlukan dalam pertumbuhan Nap C. Pertumbuhan Nap C yang disebabkan oleh penambahan 40 mg/l yeast extract adalah tidak ketara ($P>0.05$).

Nap C berupaya mengurai 36 %, 49 % dan 51 % phenanthrene pada 20 mg/l, 50 mg/l dan 100 mg/l phenanthrene masing-masing dalam keadaan persekitaran optima; pH 8, saliniti 30 g/l, suhu 30°C dan 40 mg/l yeast extract. Pertumbuhan Nap C adalah tertinggi pada 100 mg/l phenanthrene, diikuti dengan 50 mg/l and 20 mg/l. Analisis kinetik telah dilaksanakan untuk menentukan kadar penguraian phenanthrene dan kadar pertumbuhan Nap C pada phenanthrene. Daripada persamaan Michaelis-Menten, v_{max} and k_m adalah 9.86×10^{-5} Mh^{-1} and 0.017 M masing-masing. Substrak affiniti, a_s oleh phenanthrene adalah 5.8×10^{-3} h^{-1}. Manakala berdasar kepada persamaan Monod, μ_{max} dan k_s adalah 0.042 h^{-1} dan 277.67 μM masing-masing. Masa minimum untuk Nap C berganda, G adalah 16.5 h.

ABSTRACT

Nap C, an oil-oxidizing bacterium was isolated from sediment of Port Dickson coastal water. It is a gram-negative bacterium and form spore under unfavourable conditions. The optimum environmental conditions for the growth of Nap C on phenanthrene were pH 8, salinity 30 g/l and temperature 30 °C. Besides, 40 mg/l of yeast extract was required for Nap C to grow on phenanthrene in the synthetic medium. Growth supported by addition of 40 mg/l yeast extract was insignificant ($P>0.05$).

Nap C was able to degrade 36 %, 49 % and 51 % phenanthrene in synthetic marine medium containing 20 mg/l, 50 mg/l and 100 mg/l phenanthrene respectively under optimal environmental conditions; pH 8, salinity 30 g/l, temperature 30 °C and 40 mg/l of yeast extract. Growth of Nap C was highest at 100 mg/l phenanthrene, followed by 50 mg/l and 20 mg/l. Kinetics analysis was conducted to determine the biodegradation rate and growth rate of Nap C. From Michaelis-Menten equation, v_{max} and k_m were 9.86 x 10^{-5} Mh^{-1} and 0.017 M respectively. Substrate affinity, a_s of phenanthrene was 5.8 x 10^{-3} h^{-1}. While based on the Monod equation, μ_{max} and k_s were 0.042 h^{-1} and 277.67 μM respectively. The minimum doubling time, G for Nap C on phenanthrene was 16.5 h.