

Biodegradation of Crude Oil by Biosurfactant-Producing Bacteria Isolated From the Coasts of Bandar Abbas

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Received date: 2017.09.21

Reception date: 2018.06.02

Abstract

Persian Gulf is one of the most diverse ecosystems in the world and because of its strategic location constantly exposed to oil pollution. As a result, development of efficient techniques for treating contaminants is required. The aims of the present study were to determine biosurfactant production by TA1 (*Alcanivorax dieselolei*), to study the ability of TA1 to utilize different fractions of oil and crude oil biodegradation kinetic was studied. TA1 ability to produce biosurfactant in mineral salt medium containing different carbon sources was measured. The ability of TA1 to degrade different fractions of crude oil was studied using gravimetrically. Biodegradation kinetics of crude oil was performed in the mediums containing different concentrations of crude oil. Various substrate inhibition models were compared by fitting them to the experimental data using software. The results showed TA1 only in a medium containing crude oil was able to produce biosurfactant. Respectively, 95.46 percent, 89.52 percent, 29.95 percent and 27.20 percent of aliphatic, aromatic, resin and asphaltene in crude oil were consumed by TA1. TA1 grew on culture medium containing different concentrations of crude oil and with increasing concentrations lag phase be longer and growth rate and biodegradation reduced. Experimentally it was observed that the kinetic biodegradation of crude oil was best described by Aiba model. According to the biosurfactant production, the ability of this strain to degrade different fractions of oil and the ability of TA1 in the consumption of hydrocarbon compounds in high concentrations, this strain can be efficiently used for bioremediation of petroleum-contaminated areas.

Keywords: Crude oil, Kinetics, *Alcanivorax dieselolei*, Biodegradation.