

Study on surface tension decrease by indigenous bacteria isolated from petroleum reservoir of Myanmar for enhanced oil recovery

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Microbial enhanced oil recovery (MEOR), which is one of the enhanced oil recovery (EOR) methods, focuses on developing an efficient, economical and eco-friendly microbial treatment to recover residual oil from a reservoir. Bacteria can metabolize hydrocarbons and its metabolic products (e.g., biosurfactant, acid, gas) can be used to reduce the paraffin build-up in oil wells [1]. The objective of this study was to isolate, identify, and characterize the microorganisms which can grow in oil reservoir conditions. This study was also intended to determine the optimum condition for growth of the microorganisms by applying simulation system for enhanced oil/gas recovery.

For application to MEOR technology, the ability of biosurfactants, which were produced by indigenous bacteria isolated from a crude oil reservoir in Myanmar, to decrease surface tension was investigated. When various carbon sources were supplied to the bacterial isolates, *Bacillus* spp., designated as BS1 and BS2, showed high biomass growth and decrease in surface tension under glucose supply. Effect of pH and temperature on variation of surface tension was examined under the conditions of 100°C and pH 2, 4, 7, and 11. As a result, the biosurfactant produced by BS1 exhibited stable variation of surface tension, showing relatively low effect under various conditions. The biosurfactants produced by each bacterial isolate were separated and purified, and BS1 and BS2 produced the yield of biosurfactant of 0.51 g/L and 0.26 g/L. CMC value of biosurfactants produced by BS1 and BS2 were 2.0 g/L and 0.5 g/L, respectively. In addition, the *Bacillus* spp. were evaluated for their oil-degrading and biosurfactant-production capabilities in sand-pack columns. BS2 was able to increase the oil recovery with about 68% of heavy crude oil.

[1] Bass and Lappin-Scott (1997) *Oilfield Rev.* **9**, 17–25.