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BOOK of ABSTRACTS

Emulsification properties of hydrocarbon oxidizing microorganisms

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Global oil consumption is constantly increasing over the last 20 years, the average increase was 1.45% per year, also the general trend of increase in production is maintained. It is no secret that the age of "easy oil" is coming to an end. Most of the world's largest producing fields are approaching depletion, and their remaining reserves are classified as hard to recover. Residual oil reserves reach an average of 55-75% of the initial geological reserves of oil in the ground. Consequently, the increase in oil recovery by 5-10% would be equivalent to the discovery of new deposits.

Nowadays, the majority of oil reserves of Kazakhstan, has entered an advanced stage of development, the current water cut - the proportion of water in the produced fluid - more than 80%.

Microbial enhanced oil recovery technology is diverse activity of the formation of the microflora: the formation of acids that dissolve the host rocks and increase the porosity and permeability; gas formation, leading to a decrease in viscosity oil and dissolving carbonate rocks, thus increasing the permeability of the formation and facilitating the displacement of oil; produce a wide variety of high and low molecular weight biosurfactants, biopolymers and other compounds, emulsifying oil, reducing its viscosity and interfacial tension at the oil-water interface; the formation of microbial biomass, causing emulsification of the oil, changing the wettability of rocks. At the heart of microbial enhanced oil recovery technology is diverse activity of the formation of the microflora: the formation of acids that dissolve the host rocks and increase the porosity and permeability; gas formation, leading to a decrease in viscosity oil and dissolving carbonate rocks, thus increasing the permeability of the formation and facilitating the displacement of oil; produce a wide variety of high and low molecular weight biosurfactants, biopolymers and other compounds, emulsifying oil, reducing its viscosity and interfacial tension at the oil-water interface; the formation of microbial biomass, causing emulsification of the oil.

We report here emulsification properties of biosurfactant produced by 20 local cultures of microorganisms in different hydrocarbon sources (oil, diesel fuel, hexane, benzene and gasoline) were studied.

The emulsification activity of the produced biosurfactants was tested with different hydrocarbons. Table 2 showed that sunflower oil, heptadecane and paraffin were efficiently emulsified.

This study demonstrated that 12 cultures - active producers of biosurfactants, so Ps.aeruginosa H14 and emulsifying indexes of Ps. alcaligenes H15 during growth on medium containing oil, diesel, hexane, benzene and gasoline were 84% and 80%; 80% and 88%; 86% and 80%; 77% and 79%; 89% and 80%, respectively. It is known that microorganisms having emulsification index above 50% are considered promising biosurfactant producers.

The results show that the sources of hydrocarbon affect the ability to produce biosurfactants by microorganisms.

Bioremediation of crude oil by free and immobilized microorganisms

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One of the most perspective method for the recovery of oil-contaminated soils is the use of biotechnological methods for the success of which requires the creation of microbial preparations based on oil-oxidizing microorganism with high activity. Combining in one material capability of physical and chemical adsorption of oil and its active microbial destructive involved in this process is achieved by immobilized cells on various sorbents hydrocarbon oxidizing microorganisms.
The efficiencies of free and immobilized bacterial cultures of petroleum hydrocarbon degraders were evaluated and compared in this study.
The objects of study were associations of hydrocarbon-oxidizing microorganisms: *Pseudomonas aeruginosa* H14, Ps. ssp.BSC-1, Ps. ssp.ZG-2 isolated from contaminated soil. As sorbents was used wood chips.
Oil degradation with immobilized and free cell cultures suspended spent in mineral synthetic medium E8 with added 30% oil.
Mass concentration of oil measured on fluid analyzer "Fluorat-02".
Initial oil concentration was equal to 8, 29 mg/l.
The results showed that immobilized microorganisms association reveal higher destructive activity in relation to oil as compared to free cell cultures. When was used association *Ps. ssp.* BSC-1 : *Ps.aeruginosa H14* the concentration of oil products in water dropped from 8,29 mg /l to 3,26 mg/l and 3,1 mg /l for association *Ps. ssp.ZG-2 : Ps. ssp. BSC-1 : Ps. aeruginosa H14* respectively.
For future research bioremediation recommended to use two immobilized associations of microorganisms.