

IN SEARCH OF OIL-ADHESION REDUCTION TOOLS

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ABSTRACT

Adhesion is a molecular attraction of two immiscible (solid and liquid bodies in our case) contiguous-phase surfaces.

Investigation samples included quartz-sandstone cores from oil-well (depth – 1900 m, pressure – 170-180 atm, temperature – 70-75 °C, rock density – 2.5 g/cm³, porosity – 2.3-16.5 %, viscosity – 1.37 cp, kinematic viscosity – 10-23 cSt, oil paraffin content – 4-7 %) with 3000-4000 mg/kg of the oil content, and fuel-oil contaminated soil, 5000-6000 mg/kg (containing paraffin-naphthene hydrocarbons – 15 %, olefins and cyclodiolefins – 5 %, alkylaromatic and alkyldiaromatic hydrocarbons – 5 %, polyaromatic hydrocarbons – 20 %, benzene and alcoholic benzene resins – 55 %). Adhesion reduction efficiency was assessed by quantity of the oil extracted from the substratum. Established, that the oil extraction from the core and from the contaminated soil process is facilitated by metabolic products of thermophilic bacteria *Bacillus* sp.

Investigated the ability of 30 micromycetes (*Debaryomyces*, *Dekkera*, *Hansenula*, *Kluyveromyces*, *Pichia*, *Saccharomyces*, *Geotrichum*, *Candida*, *Lipomyces*, *Wingea*, and *Cryptococcus* particular species strains) selected from various substrata, to carry out fermentation of various carbon sources and resulting CO₂ impact on the oil-bearing sandstone and the oil-contaminated soil under 20 °C and 50 °C thermal conditions. *Debaryomyces* and *Kluyveromyces* species strains characterized by their active glucose, galactose, saccharose and lactose fermentation, and the resulting CO₂ and other metabolite impact on the oil-bearing substrata was the most effective.

Oil extraction from the substrata was facilitated by application of surface-active substances like alkylbenzenesulphonate and a composition of several compounds (natrium alkylacrylsulphonates, secondary butylalcohol, polysaccharide, natrium chloride, alkylamides). Viable compound composition shall be non-toxic and efficient at 70-80 °C and higher temperatures. Work results are important for both remediation of the oil- (fuel-oil) contaminated soil and supplementary extraction of the oil from exploited oil-wells.