SELECTION AND CHARACTERIZATION OF BIOPOLYMER PRODUCING BATERIA AND ITS POTENTIAL ANALYSIS FOR *MICROBIAL ENHANCED OIL RECOVERY* (MEOR) APPLICATION

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ABSTRACT

Polymer flooding is one of enhanced oil recovery technology used to surpress the decreasing production rate of petroleum oil. The use of synthetic polymers for the polymer process poses environmental problems because of its non-biodegradability, so the use of biopolymers as synthetic polymer substitutions received much attention. This study discusses the selection of the best biopolymer-producing bacteria isolated from nuclear reactor cooling towers and analysis of its potential for Microbial Enhanced Oil Recovery (MEOR). This research consists of five studies, mentioned as selection and identification of biopolymer-producing bacteria, optimization of carbon to nitrogen ratio, analysis of the bacterial grwoth curve and biopolymer production curve, biopolymer characterization through rheological tests and Fourier Transfor-infra-Red (FT-IR), and biopolymer stability analysis of variations in pH, salinity and temperature. In the biopolymer production medium, carbon and nitrogen sources such as sucrose and NH4Cl are used. The optimization design was made using Design Expert 11.0 software with the Central Composite Circumscribed design type using two variables namely carbon and nitrogen concentrations and the responses consistof cell numbers, dry weight biopolymers and supernatant viscosity. Characteristics of selected biopolymer producing bacterial isolates were Gram negative formed bacilli in the form of yellowish rounded colonies. Selected isolates have a viscosity of the growth medium supernatant 1.0365 cP (25˚C, 1 atm) with a percentage reduction of 26.96% when the test temperature increased to 50˚C. Optimal sucrose and NH4Cl concentrations obtained were alternately 40 and 2 g / L. Based on bacterial growth curve and its biopolymer production curve, it can be seen that the biopolymers produced are growth asscociated product. The inoculum age for the biopolymer production process used is 12 hours with a specific growth rate of 0.101 / hour. Based on FT-IR characterization carried out on biopolymer crude extracts, it is estimated that biopolymers have alkanes, alkenes, ethers and aromatic groups in their structure. Rheological analysis shows that biopolymers belong to Newtonian non-fluids with pseudoplastic properties. Biopolymers have a stable viscosity in the pH range 2-12 and further increase to 20% salinity. Optimal temperatures for the application of biopolymers are placed in the range of 25-30˚C. These results indicate that the biopolymer produced is potential to be applied for Microbial Enhanced Oil Recovery (MEOR) in reservoirs with moderate tempered wellbore.

Keywords : *biopolymer, Box-Behnken, CCD, rheology, viscosity*