65. Title: Biotransformation of asphaltene through microbial consortium

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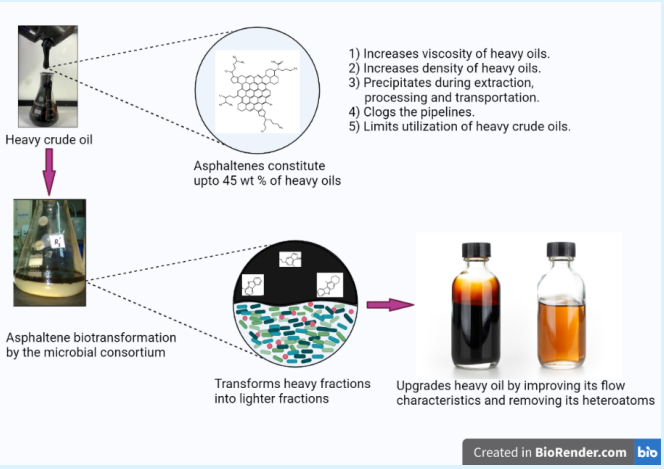
Keywords: Heavy crude oil, Asphaltene, Upgradation, Consortium

Domain: Renewable Energy (Biotechnology)

Summary: Reserves of conventional crude oil are depleting at an alarming rate, thus there is growing interest in utilizing the vast reserves of unconventional oils. Upgrading of heavy crudes by chemical process demands extreme conditions and is therefore, energy-intensive as well as cost-intensive. Biological processing of heavy crude oil may provide an alternative or complementary process with less severe process conditions and higher selectivity to specific reactions to upgrade oil. Biocatalysts that can access the recalcitrant asphaltene like compounds and alter them with improved efficacy are desired. In the present technology, a 9 membered consortium was isolated by enrichment culture using oil-contaminated soil supplemented with asphaltene as carbon source. The members of the consortium were identified by 16S rRNA sequencing.



- Maximum of 87% asphaltene biotransformation achieved in 3 weeks.
- Incorporation of oxygen into the structure of asphaltene and removal of around 80% of N and S from asphaltene.
- Improvement in flow characteristics of heavy oil by reducing its viscosity by 91% within 14 days upgraded oil was cleaner as compared to untreated oil due to removal of N and S.
- Process preserves the calorific value of the fuel as no decrease in hydrocarbon content is observed.

Advantages:

- Mild process conditions (Temperature = 30°C and Pressure = 1 atm)
- Higher specificity of the process
- No decrease in calorific value of the fuel
- Higher efficiency of the process

Applications: Petroleum Biotechnology

Scale of Development: Developed at lab scale, Biotransformation and characterization studies done

Technology Readiness Level: 4

IP Status: Indian Patent Application 202011050959