Profiling of Indigenous Microbial Community Dynamics and Metabolic Activity During Enrichment in Molasses-Supplemented Crude Oil-Brine Mixtures for Improved Understanding of Microbial Enhanced Oil Recovery

An anaerobic incubation using crude oil and brine from a North Sea reservoir were conducted to gain increased understanding of indigenous microbial community development, metabolite production, and the effects on the oil–brine system after addition of a complex carbon source, molasses, with or without nitrate to boost microbial growth. Growth of the indigenous microbes was stimulated by addition of molasses. Pyrosequencing showed that specifically *Anaerobaculum*, *Petrotoga*, and *Methanothermococcus* were enriched. Addition of nitrate favored the growth of *Petrotoga* over *Anaerobaculum*. The microbial growth caused changes in the crude oil–brine system: formation of oil emulsions, and reduction of interfacial tension (IFT). Reduction in IFT was associated with microbes being present at the oil–brine interface. These findings suggest that stimulation of indigenous microbial growth by addition of molasses has potential as microbial enhanced oil recovery (MEOR) strategy in North Sea oil reservoirs.

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