



Harnessing the Power of Microbes to Boost Oil Production: Microbial Enhanced Oil Recovery

Rachel Chew^{*}

Department of Chemical and Environmental Engineering, University of Nottingham, Semenyih, Malaysia

DESCRIPTION

Oil has long been a crucial source of energy for modern society, powering industries, transportation, and everyday life. However, as oil reserves become harder to access and extract, oil production faces numerous challenges. One promising technology that has gained traction in recent years is Microbial Enhanced Oil Recovery (MEOR), which involves using microorganisms to improve oil recovery from reservoirs. MEOR has shown great potential in increasing oil production and reducing environmental impact, making it an exciting area of research and development in the oil and gas industry.

Microbes, including bacteria, fungi, and other microorganisms, are naturally present in oil reservoirs. However, their role in oil recovery was initially overlooked. In the 20th century, researchers began to realize that some microorganisms could survive and thrive in the harsh conditions of oil reservoirs, including high temperatures, high pressure, and high salinity. These microbes can metabolize the oil, producing by-products that can alter the properties of the oil and rock, ultimately leading to increased oil recovery.

MEOR techniques involve injecting selected microbes, also known as "biodegraders" or "bioconverters," into oil reservoirs to stimulate oil production. These microbes can improve oil recovery in several ways. In first step they break down complex hydrocarbons in the oil into simpler compounds, making the oil more mobile and easier to extract. In next step they can produce gases or acids that can change the properties of the oil, reducing its viscosity and improving its flow. Finally they can create biofilms, which are thin layers of microbes that can coat the surfaces of the rock and help to release trapped oil. Overall, the microbial activity can help to mobilize the trapped oil and increase its recovery from the reservoir.

One type of microorganism commonly used in MEOR is the bacteria. Bacteria such as *Bacillus*, *Pseudomonas*, and *Clostridium* have been found to be effective in improving oil recovery. These bacteria can produce enzymes that break down the oil into simpler compounds, such as fatty acids, which can reduce the viscosity of the oil and enhance its flow. They can also produce gases, such as carbon dioxide and methane, which can help to displace the oil from the rock pores and improve its recovery. Some bacteria can even survive in the presence of toxic substances, such as hydrogen sulfide, which is commonly found in oil reservoirs, and convert it into less harmful compounds.

Fungi, another type of microorganism, have also shown promise in MEOR. Fungi such as *Aspergillus*, *Penicillium*, and *Candida* have been found to produce enzymes that can break down complex hydrocarbons in the oil into simpler compounds. They can also produce biofilms that can coat the rock surfaces and release trapped oil. Fungi are known for their ability to tolerate extreme conditions, such as high temperatures and high salinity, making them suitable for use in MEOR.

MEOR has several advantages over traditional oil recovery methods. It can potentially increase oil recovery by 5%-25%, depending on the reservoir characteristics and the type of microbes used. This can result in higher production rates and extended production life from existing oil reservoirs, which can help to extend the lifespan of oil fields and reduce the need for new drilling. MEOR can be applied to mature or depleted oil reservoirs that have lower oil recovery rates, making it a viable option for enhancing production in reservoirs that are nearing the end of their economic life. MEOR is generally environmental friendly, as it does not involve the use of chemicals or toxic substances that can harm the environment or human health.

Correspondence to: Rachel Chew, Department of Chemical and Environmental Engineering, University of Nottingham, Semenyih, Malaysia, E-mail: chewrach@edu.com

Received: 29-Mar-2023, Manuscript No. JPEB-23-21070; Editor assigned: 31-Mar-2023, Pre QC No. JPEB-23- 21070 (PQ); Reviewed: 21-Apr-2023, QC No JPEB-23-21070; Revised: 28-Apr-2023, Manuscript No. JPEB-23-21070 (R); Published: 05-May-2023, DOI: 10.35248/2157-7463.23.14.514

Citation: Chew R (2023) Harnessing the Power of Microbes to Boost Oil Production: Microbial Enhanced Oil Recovery. J Pet Environ Biotechnol. 14:514.

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