



IJEAST

INTERNATIONAL JOURNAL
OF ENGINEERING APPLIED SCIENCE
AND TECHNOLOGY



VOLUME : 2 ISSUE : 4 Print / Issue Publication Date: 31-Mar-2017



ISSN : 2455-2143



Indexed In



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MECHANISM FOR MICROBIAL ENHANCED OIL RECOVERY- REVIEW STUDY (MEOR)

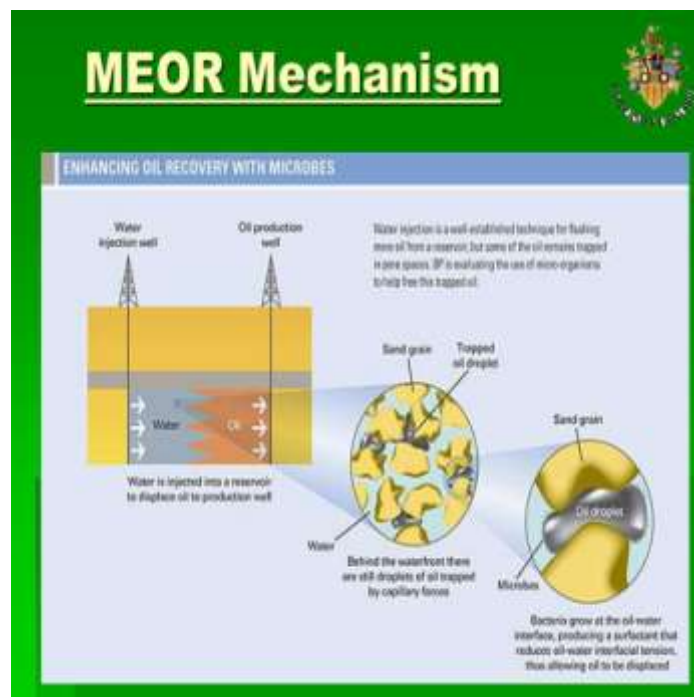
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Abstract - As the time is passing the need for energy is also increasing at an alarming rate. This is directly followed by the need of increase in extraction of the oil. So after the primary and secondary treatment of oil production another process is being followed i.e. the tertiary form of extraction that includes the enhanced oil recovery (EOR). The use of micro organisms for the extraction of oil is called microbial enhanced oil recovery (MEOR). This technique has huge potential as it can act as cost effective to extract oil from the porous media. In MEOR technology the type of reservoir plays a very important role. There are different microbial stimulations including in in-situ, ex-situ etc. The bacterias/microbes involved in the process are – *Bacillus sp.*, *Leuconostoc*, *Acinetobacter*, *Pseudomonas* etc. Alternative promotion of MEOR is done by injecting some exogenous microbes that are adapted to oil reservoir conditions and can be able to produce the desired products. Biomass is provided for the cellular division to produce energy that leads to the production of oil. MEOR has got a great future if conducted properly all over the world including our home country so that it benefits mankind. It can be biofriendly too as it uses microbes hence securing the demand of oil in the future.

Keywords- *microbial, production, reservoir, surface tension*

I. INTRODUCTION.

Microbial Enhanced oil Recovery is a tertiary technology in engineering that is used for the extraction of oil with the help of micro organisms. The main aim of MEOR is to improve the recovery of extraction of oil which has been trap inside the soil or any porous media after completing the secondary level of extraction. As the oil prices are being increasing day by day the demand for technology is also increasing. Many researchers have been taken out and field test have also been conducted for the process. This technology aims for the increment in oil production.



The microbes used in the process are familiar to the surrounding of the reservoir hence completing the process. The biomass used as nutrients for the process lead to the division of the cellular bodies hence the microbe's acts as surfactants which are useful for lowering interfacial tension and works as emulsifiers. After several decades of research and successful application the claims of MEOR is accepted to be a mature technology that has a great scope in future. Despite of its less application today this technique is considered to be one of the cheapest methods that can fulfill our needs in the coming generation.



II. LITERATURE SURVEY

[1]MEOR(Microbial enhanced oil recovery) is a tertiary oil producing technique after the polymer, chemical, thermal flooding. It applies biological organisms for the development of oil production. [2]The mechanism of MEOR is a very complex one, due to this technology chemical flooding developed. This is low cost and also environmentally feasible process. [3]But this form is newly developed due to which literature on MEOR is based on laboratory experiment that are of insufficient durations. As a result full proof tests is required to accept the technology. [4]This is a cost effective process for the recovery of oil from the stripper wells. But studying the micro organisms and reservoir fluids we can apply for the success of the technology. [5] It provides information about the reservoir used for the MEOR field projects, the acceptance of the biotechnological processes can improve the extraction of oil production. [6]Microbial enhanced oil recovery(MEOR) includes waterflooding projects which shows a total dissolved solids of value as high as 32%. The permeability of reservoir rocks ranges about 1-1000 md. [7]A research has been carried out in china that shows novel micro organisms that produces polymer. [8]There are about 2500-3000 wells that were treated with microbial products that includes the basic sediments,paraffin or water. This resulted in increment in oil production. Hence, this says that the insertion of microbes in the wellbore can lead to chemical treatment both in efficiency as well as in cost. [9]The wells are being stimulated basically by improving the production of oils or by decreasing the cost of maintainance. Hence many countries such as Poland, Hungary, USSR etc conducted the well stimulation technique. [10]Many types of well stimulation techniques are there out of which is our single well injection that uses low cost nutrients usually molasses hence increases the oil production . Micro organisms used, produces surfactants that reduces the intefacial tension and causes emulsification hence, altering the relative permeability of oil [11] the injected micro-organisms can be remain in the water phase and can act as to increase the relative permeability of oil and decrease the permeability of water. In an experiment a bacteria named Betacoccus Dextronicus is used that improved the ratio of oil/water. [12] Many projects on the technology is being carried of that generally improve production of gas and surfactant by the micro organisms. [13] Researchers at the university of Calgary have concluded the use of ultramicrobacteria so as to plug the area around the production well and thus eliminate the water logging problems. [14] Before conducting a multiwell waterflood, well injection trial can be carried out and if injectivity is not affected by microbial injection then there will be no change in permeability. [15] Biomass are being given as nutrients thatare being facilitate using injecting protocols. Once microbial activity increases it results in the increased alkalinity. [16] It is very much important that the micro organisms that we uses

must survive in the reservoir condition,than only effective MEOR can take places. [17] The reservoir with a suitable condition can only be used for MEOR. Its depth should be less than 6,800 ft. The rock permeability must be greater than 75md and the injected water must have a salinity of less than 100,000 ppm. [18] To recover a significant amount of oil, reservoir should be highly channelled. Injecting a micro organisms hence flows through a highly permeable zone. [19] As surfactants can reduce tension hence a bacterium name Pseudomonas aeruginosa MM1011 to grow that produces rhamnolipid that lower the surface tension of the water. [20] Even though MEOR is an advanced technology but due to lack of mathematical models it is not being describe better. Hence well defined and well managed recovery mechanism is required so that the technology can be used in large scale.

III. CONCLUSION

Microbial enhanced oil recovery is an environmental friendly process. It is a cost effective method. It main aim is to enhance the increment in oil production and to upgrade the present EOR. Various types of microbes are being used in the process. Many researchers have been taken out in laboratory as well as field test is done so as to initiate the technique as soon as possible. It is a very ad advanced technique as many researchers have found if, done with specialization can be effective. But it can be seen that the microbes used in the process are aerobes that can act as a corrosive agent for the pipeline. Anaerobic microbes can be used but they consume large amount of sugar which is not economically feasible. So, here two improvements can be done as given below-

- 1) *If we provide an anticorrosive layer to the underground pipeline.*
- 2) *By using biotechnology we can develop some microbes that works like aerobes but acts as anti-corrosive agents.*

IV. FUTURE SCOPE

1. It is well suited to be used in today's economic climate because there is a potential for increment in production of oil in future.
2. It uses microbes that are found in the environment whose cellular products are biodegradable.
3. It is economically attractive for mature oil field.
4. It is an easy applicable and less expensive set up.
5. It contribute to the risk of rise in oil prices due to decrease quantity of Crude Oil hence, this technique proves to be effective to solve the problem.



V. REFERENCES

- [1] Songhua Liu, "School of life Sciences" Fudan University Shanghai, China 2011.
- [2] Shuang Liang, School of Petroleum engineering northeast Petroleum University Daging, Heilongjiang Province, China.
- [3] Brown LR.Curr Opin, Microbial, Mississippi, State University, USA 2010 pp.316-320.
- [4] Bryant, R.S., and Burchfield, T.E, "Review of Oil Recovery Technology," SPE Reservoir, Vol.4, May 1989, pp.151-154.
- [5] Bryant, R.S., "MEOR Data Base and Evaluation of Reservoir Characteristics for MEOR Projects," U.S. Dept. of Energy, Report No. NIPER-272, August 1989, NTIS order No. DE89000764.
- [6] Costerton, J.W., Cusack, F., and MacLeod, F.A., "Microbial Process for Selectively Plugging a Subterranean Formation," U.S. Patent No.4, 800,959, Jan 31, 1989.
- [7] Moses, V., personal communication, April 1989.
- [8] Schneider, Dennis R., Micro-Bac International Inc., personal communication, Aug. 20, 1990.
- [9] Pelgar, J., "MEOR Research on Wellbore stimulation," International Conference on Microbial Enhancement of Oil Recovery, Norman, Okla., May 27-31, 1990.
- [10] Hitzman, D.O., "Review of Microbial Enhanced Oil Recovery Field Tests," Symposium on Application of Microorganisms to Petroleum Technology, U.S Dept of Energy Report No.NIPER-351, September 1988. NTIS order No.88001232.
- [11] Jack, T.R., Thompson, B.G., and Diblasio, E., "The Potential for Use of Microbes in the Production of Heavy Oil," International Conference on Microbial Enhanced Oil Recovery, Afton, Okla., May 16-21, 1982, Dept. of Energy Report No.Conf-8205140, 1982, pp 88-93.
- [12] Yarbrough, H.F., and Coty, V.F., 'Microbial Enhanced Oil Recovery from the Upper Cretaceous Nacatoch Formation, Union Country, Arkansas,' International Conf. on Microbial Enhanced Oil Recovery, Afton, Okla., May 16-21 1982, Dept. of Energy Report No.conf-8205140, 1982, pp.149-153
- [13] Wang, X.Y., "Studies of the Thermally Generated Gel agent Produced by *Ps.Aeruginosa* for EOR," International Conference on Microbial Enhancement of Oil Recovery, Norman, Okla., May 27-31, 1990
- [14] Bryant, R.S., Burchfield, T.E., Dennis, M.D., Hitzman, D.O., "Microbial Enhanced Water flooding: Mink Unit Project," SPE Reservoir Engineering, Vol.5, February 1990.
- [15] Knapp, R.M., McInerney, M.J, Menzie, D.E., and Raiders, R.A., "Microbial Field Pilot Study," U.S dept.of Energy Report No.DOE/BC/14084-6, January 1989
- [16] Bryant, R.S., Burchfield, T.E., Dennis, M.D., Hitzman, D.O., and Porter, R.E., "Microbial Enhanced Water flooding: A pilot study," International Conference on MEOR, Norman, Okla., May 27-31, 1990.
- [17] Bryant, R.S., "Screening Criteria for MEOR Processes," U.S dept. of Energy report No.NIPER-278 August 1990 NTIS order No.-DE91002208
- [18] Chase, K.L., Bryant, R.S., Bertus, K.M., and Stepp, A.K., "Investigations of microbial mechanisms for oil mobilization in porous media," International Conference on MEOR, Norman,, Okla., 1990.
- [19] Amani H. et.al. Application of Biochemist Biotech, 2013
- [20] Awan, A.R., R.Teigland, and J.Kleppe "Enhanced oil recovery process", SPE Reservoir Evaluation and Engineering 2008 pp.497-512.

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