

# Effect of different water injection rate on reservoir performance: A Case Study of Azadegan fractured oil reservoir

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## Abstract

A naturally fractured reservoir may be divided vertically into several zones, i.e. gas cap, gas invaded, undersaturated oil, water invaded, and aquifer. Gravity drainage is the main oil producing mechanism in gas invaded zone. Depending on the wettability of the reservoir rock, the main recovery mechanism in water invaded zone will be gravity drainage or imbibition for oil wet or water wet rock, respectively. When production from a reservoir starts after a while, the production will decrease because of reservoir depletion. To enhance the final recovery there are some scenarios, one of them is water injection. Water injection has been the most used recovery method in petroleum industries due to its advantages. The injected water displaces oil from porous media to producing wells and maintains the reservoir pressure above of saturation pressure, increasing the recovery process efficiently. One of important variable is injection rate that influence the water injection performance, therefore by simulating the reservoir with different injection rate we could obtain the proper one for reservoir development.

The goal of this work is to study the impact of water injection rate on the reservoir performance and simulate the water injection performance in reservoir scale. This work is a case study on Azadegan oil reservoir.

This work is done on investigation of water injection in sector A of Azadegan oil reservoir that it has a dual porosity manner. Water injection simulations were performed at different rates. Before any injections the plateau time is about 5000 days. After putting the injection wells and applies the rates it is observed that the plateau time is increased. Higher water injection rates results in higher oil production so water injection is suitable for this dual porosity case. Because water moves through fractures quickly and so capillary imbibition process can help push the oil to producing well.

**Keywords:** Azadegan oil reservoir, water injection, reservoir performance, fracture reservoir

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