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Evaluation of Non-Hydrocarbon Gas Injection in Fractured Carbonate Reservoirs of Natural Asmari Reservoir Iran

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Abstract

Gas injection EOR processes is one of the most effective is one of the methods of naturally fractured reservoirs. The gas injection mechanisms Improve the utilization of molecular diffusion, gravity drainage, swelling within the matrix and displacement oil is viscous. The gas injection method of Gas injection, with injection) or non-matrix fusion of (and the injected gas flow rate on oil recovery from the reservoir rock matrix blocks Effective is fractured. Moving forces and gravity drainage is controlled by the interaction. It also increases the penetration and dispersion During the gas injection resulted in enhanced oil recovery. In this study, the main purpose of the study and simulation of non-hydrocarbon fluid injection of carbon dioxide into reservoirs Gachsaran oil field. Nitrogen and other gases carbon dioxide Hydrocarbons, which are available for injection. MMP by simulation thin tube is estimated to be equal to 2700 feet. PVTi made by the reservoir fluid model and a model tank sector Dual porosity by activating the built-in gravity drainage and the influence of molecular simulation is conducted by the Eclipse 300. Various simulation of water injection, gas injection, gas injection of carbon dioxide is done best by a factor of carbon dioxide Recycling 47.8 percent.

Keywords: fractured reservoirs, gravity drainage, gas, oil recovery, Asmari, molecular diffusion

1. Introduction

In naturally fractured carbonate reservoirs of oil states like Iran and Middle wettability are often invaded zone 1 has been expanded gas. In the area of oil-saturated matrix block enclosed by the slots Azgaz saturated with gas and oil because of density differences Matrix is the gap loss.
Gravity drainage occurs only if the matrix blocks height greater than the height of capillary Threshold (Feng, 1991). Gravity and capillary major forces in fractured reservoirs, while in conventional reservoirs viscous force is dominant. Vampire gravity and capillary forces and re-associated with capillary continuity is related to capillary pressure gap.
At Vampire re-integration phenomena capillary and gravity drainage process involved. The oil spill from a block matrix into the fracture network, Matrix block will lower oil-thirsty again. So

thirsty again on production rate because of viscose gravity drainage and displacement effect Leaves. Vampire power of this force depends on the size of capillary pressure oil-gas (Kazemi and Gilman 1988, S. 1986).

Process simulation block to block in naturally fractured reservoirs porosity permeability model based on dual studied and its effect on The gas-oil gravity drainage mechanism evaluated) Fung (1991. One of the disadvantages of dual porosity models is that the depth of the matrix and the gap is assumed that the effect of gravity on fluid exchange on the matrix and the gap is not explicit. The transfer Matrix flow between different blocks will not be considered (Rezai and colleagues Sunny 2011).

The gravity drainage, gas, oil pressure inside the capillary pressure due to gas pressure in the gap is less than a block matrix. Oil lower pressure inside Matrix and Matrix within the flow of oil and prevent oil flow from the matrix to divide the oil in the gap at the bottom Shvd.jryan in the slot. The reabsorption of oil is causing a delay in the recovery of matrix resorption rate is high if the delay Increases. Moving forces and gravity flow between the Matrix and the gap is controlled by many other forces such as expansion, Diffusion and viscous forces may have an effect on the recovery process. In water-oil systems, regardless of the effect of diffusion and Also, if the water is moving at a constant pressure above the bubble point pressure of the expansion will not be considered. In this case, the pressure A positive role in the capillary and reservoir rocks with water wettability like Vampire capillary mechanism is activated. This mechanism for Matrix Blocks with little more effect and its potential decreases with increasing altitude matrix blocks (Jamali et al. 2010).

Kyte (1970) with the oil recovery process, taking into account the effects of capillary and gravity to move water showed that oil recovery Moving rock wettability hydrophilic low-sucking mechanism is much less of the gravity separation. For matrix blocks with large size, the effects of gravity mechanism are more dominant. For oil-gas system, prevents capillary pressure of the fluid exchange and the output gap-Matrix Oil only occurs if the height difference Nft gas levels in the matrix and capillary gap is greater than the height threshold. If the height Blocks capillary matrix is smaller than the height threshold, Matrix oil blocks out to be the only continuity capillary exists between the blocks. Process block to block (bond capillary) the back vertical column of blocks is increased the oil recovery (Pratap and Kleppe 1997).

Gas through the cracks into the matrix resulted in the withdrawal of its oil and gas through the gaps is also somewhat Myanshkn and delays. As a result, the efficiency of oil recovery Yabd.mkanyzm original motion and swept up the gas tanks naturally fractured include gravity drainage, molecular diffusion and viscosity is removable. The relative effectiveness of these mechanisms depends on several factors Including permeability matrix, the intensity of the gaps, fluid properties, the injection rate, pressure and temperature of the tank. Viscous flow directly in recycling Oil has no effect because the injected gas through the gap with high permeability which included a small volume fraction on the transmission channel Will. Gravity drainage) oil and gas by density difference (in matrix blocks with high permeability have an important role in oil recovery. In the case Low matrix permeability and high intensity gap is the molecular diffusion mechanism is dominant (Shojaei 2014).

2. Simulation by ECLIPSE Software

For this study, a dual porosity model with active sector and influence the molecular mechanisms that make gravity drainage wells Just 5 spot.

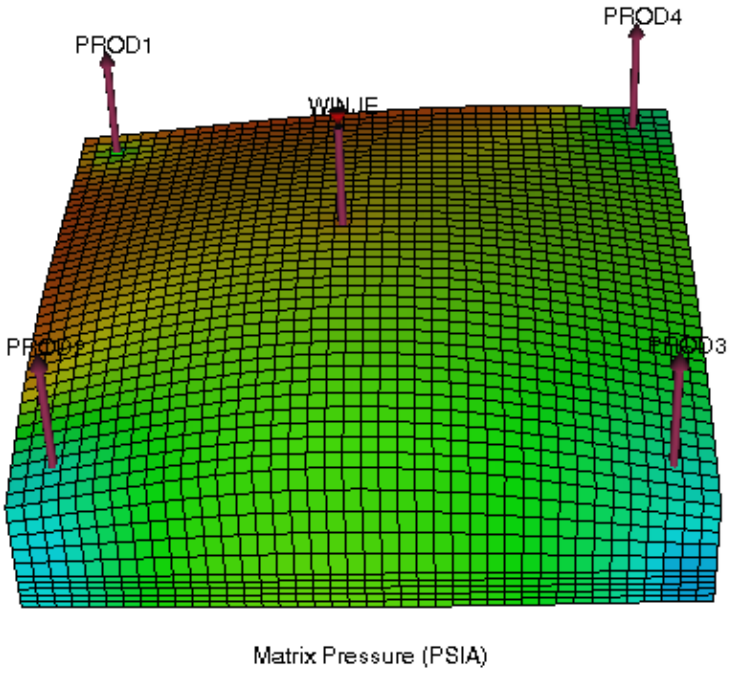

Figure 1- schematic Sector reservoir model

Darcy permeability and porosity gaps 2,000 mm 0.002 percent. Matrix porosity of 10% and an average block Darcy permeability of the matrix is 1 mm and a height of 5 feet Blocks is intended. The initial reservoir pressure at a depth equal basis Pam is 2100. Flux of water entering the bottom of the tank and the tank has a gas cap is expanded. Wettability Matrix Oil Blocks would you be willing to intermediate. Most of the remaining oil saturation in the reservoir area gas attack aimed at oil recovery injection of gas trapped in the area is to calculate MMP (MMP) thin tube simulation (Slim tube) which is used to MMP in 2700 Pam is calculated.

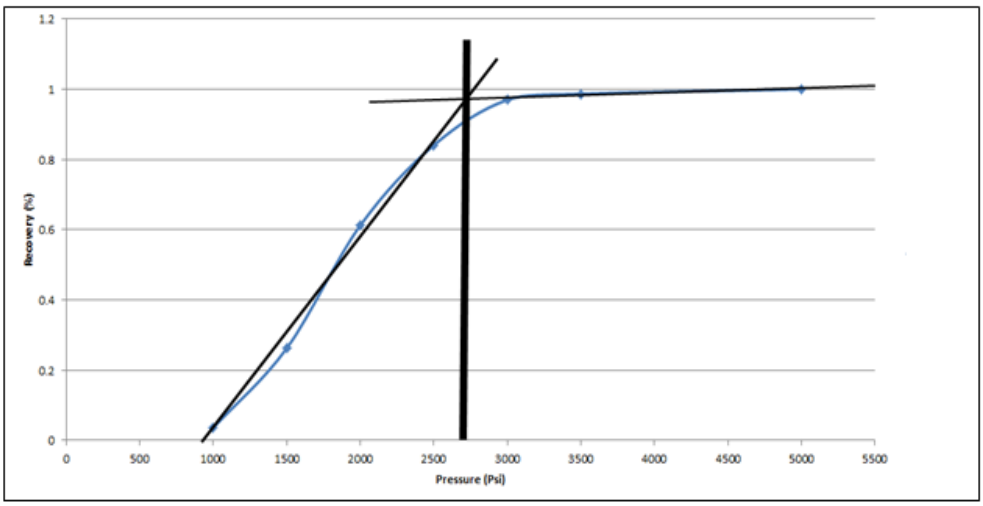

Figure 2 - estimation of minimum MMP

According to the current average reservoir pressure of 2100 feet gas injection is just non-matrix. Non-matrix penetration in gas injection, gas Duran oil is less and slower. Gas injection into the fracture network and by exchanging fluid transfer gap and matrix, leaving the oil inside Matrix helps. Simulate the injection of carbon dioxide To assay water injection and gas injection and compared to normal energy drain tank simulated in three scenarios listed. Results Scenario natural depletion, water injection and gas injection is shown in the chart below the 18 percent recovery factor for natural drain, for Water injection to inject carbon dioxide gas equal to 31.8 percent and 38.2 percent.

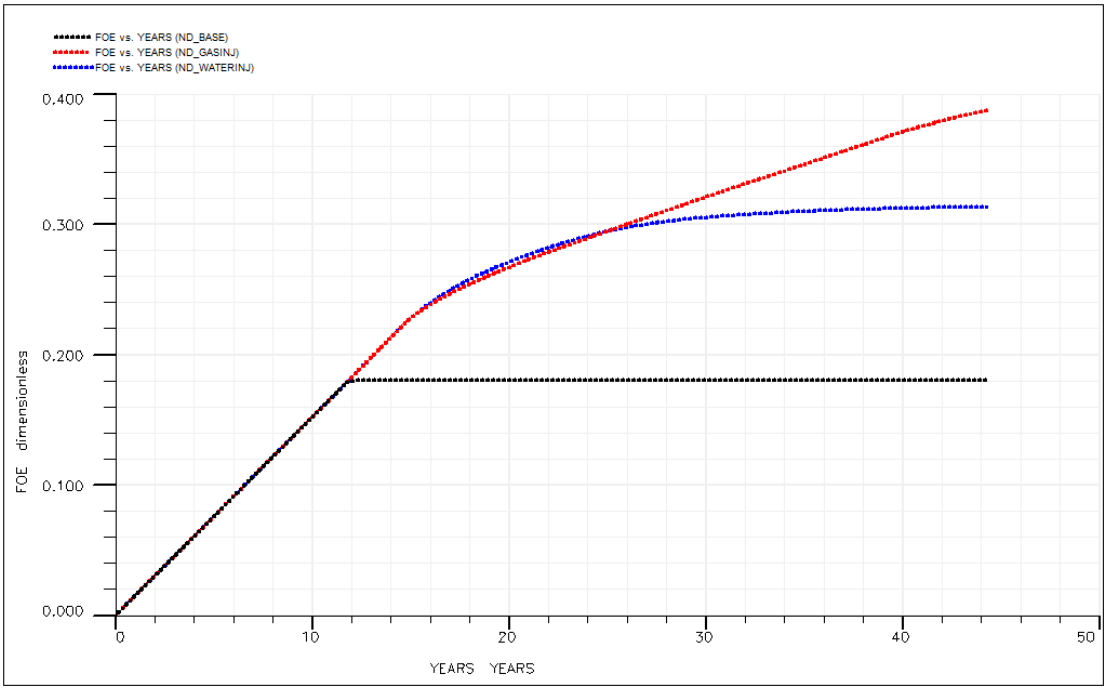

Figure 3 - the recovery factors for water injection and gas injection

Carbon dioxide gas injection for reservoir recovery increase dramatically, thus increasing the injection rate of 5,000 cubic feet 10,000 cubic feet per day is injected into the tank the results of which are shown in the following diagram. Gas injection rate increase in January Carbon recovery factor increased to 41.8 per cent. Carbon dioxide due to low density and high density difference between the oil reservoirs to increase oil recovery by gravity drainage performance of Matrix Blocks increases.

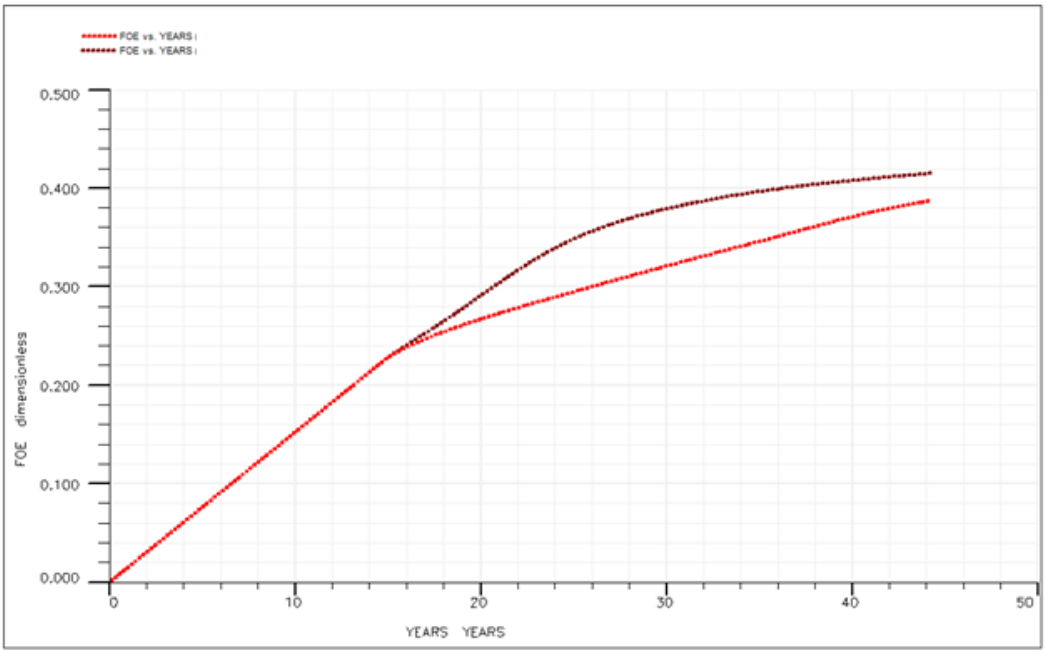

Figure 4- Sent graphs recovery factor to increase gas injection rate:

In naturally fractured reservoirs after production and gas injection processes of change and fluid contact surface area expands gas. in this Oil field decline and reduced oil recovery mode. Most of the remaining oil saturation in the reservoir area gas attack that Be considered as a target for EOR. In this scenario the process shift gas injection to improve and change Location of wells to increase oil recovery is. To do gas injection wells and wells in the upper part of the tank has been completed Manufacturing in the region's oil is drilled horizontally. The goal is to improve the mechanism is gravity drainage. Injection gas flow rate for proper evaluation of Dubai, the injection rate of 7000 cubic feet per day was best rates higher Had a significant impact on the recovery factor.

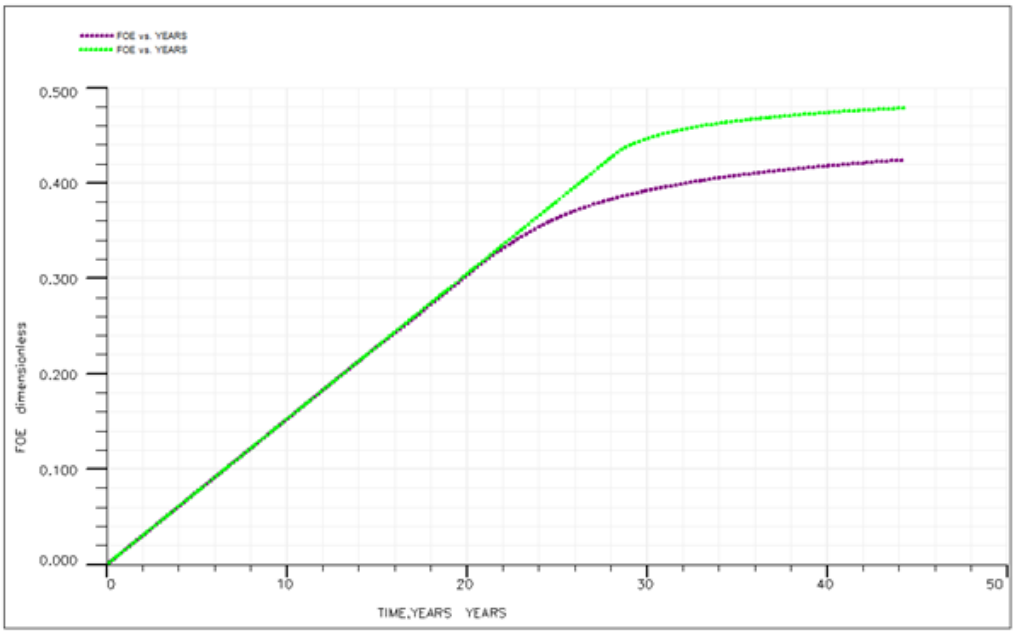

Figure 5- Sent graphs optimal recovery factor:

Injection of carbon dioxide gas with flow rate of 7000 cubic feet per day and completing horizontal wells to enhance oil recovery was 48%. High density differences within the matrix of carbon dioxide into the gap and increase oil recovery, oil and more oil from the matrix block has been removed. Horizontal production wells as well as greater surface area for tanks and wells to improve oil recovery have been established. The dominant mechanism for injecting carbon dioxide gas in fractured carbonate reservoir gravity drainage, penetration and dispersion of molecular gas phase. According The low permeability of the rock matrix and low molecular penetration Blocks is a slow process that can enable long-term mechanism is to increase oil recovery.

3. Results

Simulate different scenarios, including natural discharging, injecting nitrogen gas, carbon dioxide injection and injection of carbon dioxide in the area. Gas influx was examined. Results scenarios are as follows:

1. In the scenario of normal production recovery factor of 18 percent to 31.8 percent and the water injection to inject carbon dioxide gas tank To 38.2 percent.

2. The scenario for the injection of carbon dioxide injection rate increase reservoir recovery factor of 41.8 percent and better performance Is. In this fractured carbonate reservoir of natural gravity drainage mechanism is a dominant mechanism that gas injection to increase its efficiency and increased recovery factor.

3. Optimize production and injection wells location has been improved oil recovery. Gas injection in the upper part of the reservoir and completion of wells Production horizontally to increase recycling to 48 percent. High density of carbon dioxide into the slot and into the oil dispute Matrix enhance oil recovery and more oil is extracted from the matrix blocks.

4. Drilling horizontal wells and wells tank provides greater surface area for improved oil recovery is that. Due to the permeability Down-the-block matrix blocks as well as the dominant mechanisms of carbon dioxide gas injection for fractured carbonate reservoir in loss Gravity, molecular penetration and dispersion of the gas phase.

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