

عنوان مقاله:

Gas gravity drainage in fractured porous media: an experimental approach

محل انتشار:

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خلاصه مقاله:

Fractured reservoirs are very important contributors to world oil and gas reserves and production. A large number of these reservoirs are produced by gravity drainage, free fall or gas injection. A fractured porous medium is comprised of two different parts: 1) the matrix portion with relatively high porosity and low permeability, and 2) the fractures which have high permeability and low porosity. Gravity drainage experiments were performed for the purpose of finding the maximum rate for various systems and investigate the effects of fracture length, liquid viscosity, matrix properties and initial oil saturation effects on the production history and characteristics of gas-liquid interface advance. Free fall gravity drainage through fractured models was investigated and emphasis was placed on the starting point of gas penetration into the matrix, the recovery rate and oil recovery in various systems. The movement of gas/oil contact was visualized and oil recovery versus time was determined experimentally. In this study we deal with water wet media containing one vertical fracture in the middle. Experiments were conducted with different size of fracture length, different liquids, and different matrix permeability for investigating the effect of permeability contrast. The production history for fractured and homogeneous porous media models with no fracture was determined. During gravity drainage the gas invades first the fractures because of high conductivity and low threshold capillary pressure and then into the matrix. Experiments show that the recovery rate increases in the models that have longer fracture. The magnitude of flow rate increase depends on fracture properties such as fracture aperture, fracture length and permeability contrast with respect to matrix permeability. The effect of fractures is stronger in media with lower matrix permeability. For a given fracture/matrix system and different initial oil saturation conditions, it was found that the production history can be correlated by plotting the fraction of recoverable oil versus time. The effect of well location on the production performance of the system was also investigated.

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