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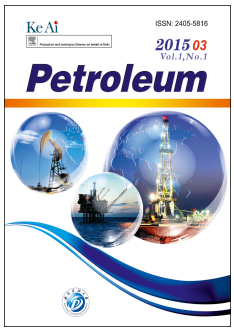

Effect of reservoir heterogeneity on air injection performance in a light oil reservoir

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Effect of reservoir heterogeneity on air injection performance in a light oil reservoir

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Summary Air injection is a good option to development light oil reservoir. As well-known that, reservoir heterogeneity has great effect for various EOR processes. This also applies to air injection. However, oil recovery mechanisms and physical processes for air injection in heterogeneous reservoir with dip angle are still not well understood. The reported setting of reservoir heterogeneous for physical model or simulation model of air injection only simply uses different-layer permeability of porous media. In practice, reservoir heterogeneity follows the principle of geostatistics. How much of contrast in permeability actually challenges the air injection in light oil reservoir? This should be investigated by using layered porous medial settings of the classical Dykstra-Parsons style. Unfortunately, there has been no work addressing this issue for air injection in light oil reservoir. In this paper, Reservoir heterogeneity is quantified based on the use of different reservoir permeability distribution according to classical Dykstra-Parsons coefficients method. The aim of this work is to investigate the effect of reservoir heterogeneity on physical process and production performance of air injection in light oil reservoir through numerical reservoir simulation approach. The basic model is calibrated based on previous study. Total eleven pseudo compounders are included in this model and ten complexity of reactions are proposed to achieve the reaction scheme. Results show that oil recovery factor is decreased with the increasing of reservoir heterogeneity both for air and N_2 injection from updip location, which is against the working behavior of air injection from updip location. Reservoir heterogeneity sometimes can act as positive effect to improve sweep efficiency as well as enhance production performance for air injection. High O_2 content air injection can benefit oil recovery factor, also lead to early O_2 breakthrough in heterogeneous reservoir. Well-type does not show great effect on production performance for air injection in extreme heterogeneous reservoir. While adopting horizontal producer is favourable to promote production performance for air injection in homogenous reservoir.

Keywords: air injection; light oil; heterogeneity; Dykstra-Parsons coefficients; enhanced oil recovery; recovery mechanism