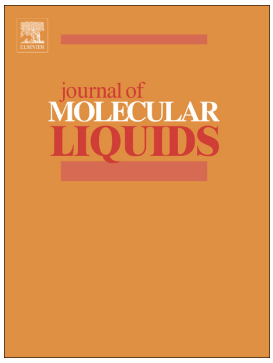

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Study of Production enhancement through Wettability Alteration in a Super-Giant Gas-Condensate Reservoir

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Abstract

Near wellbore condensate blockage phenomena commonly reduce gas production significantly. One efficient method for overcoming such problem is wettability alteration. Such issues as wettability state, treatment radius and time to reach the maximum level of production need be optimized prior to field application. In this paper, impact of these parameters are studied on gas and condensate production enhancement through wettability alteration. To do this, behavior of a well located in supergiant offshore Iranian gas condensate field is simulated and analyzed using a compositional model, single well and radial grid. The real fluid and reservoir properties of the studied well are utilized to construct the model. Different wettability states were defined using various relative permeability curves at various distances from the wellbore along with different treatment times are tested to find the best condition. Results indicate that near-wellbore wettability alteration leads to lower critical condensate saturation which has a significant impact on improving production parameters and reservoir recovery factors. Also, the highest recovery factor is achieved at optimal conditions where wettability is altered from strong liquid-wet to intermediate-wet at the small radius around the production well in early times. Furthermore, the inflow performance relationship curve (IPR) moves upward considerably which represents the magnificent production improvement.

Keywords: Gas Condensate, wettability alteration, Simulation, Condensate Blockage, Inflow Performance Relationship

1. Introduction

Gas condensate reservoirs are complex systems in the study of flow regimes and thermodynamic behavior. In gas condensate reservoirs, condensate begins to separate from the main gas stream and form a secondary phase at reservoir conditions when the reservoir pressure falls below the dew point pressure. Since the pressure drop is highest at near wellbore of production wells than any other area [1], liquid phase formation starts from this region. In general, the accumulated liquid is trapped in pore spaces due to capillary forces and low mobility [2]. This accumulation of condensate, known as condensate blockage, has some destructive effects on productivity of gas condensate wells. With increasing condensate saturation (wetting phase) in vicinity of wellbore and raising its mobility along a gas phase, the relative permeability of gas phase decreases considerably. In addition, the existence of too much liquid in near wellbore leads to

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