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Simulation of Slim Tube Test for Gas Enriched with NGL in the Reservoir Oil in One of the Southern Fields of Iran

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INTRODUCTION

One of the methods of increasing oil production is miscible gas injection. The most important parameter in the design of miscible injection method is to determine and calculate the minimum miscibility pressure. In order to obtain the best oil production, the injection operation pressure or the range of miscibility pressure should be at above. In this method, the calculation and prediction of the minimum miscibility pressure are very important. In this study, to simulate the process of gas injection in to the reservoir and to investigate the condition of miscibility, the available laboratory information and the model of slim tube have been used in Petrel (Eclipse 300) Software in a single porosity model. After modelling fluid properties, by using Winprop software, the appropriate outputs have been made to be used with Eclipse 300 Simulator. Then by simulating the injection of fluids with different composition in the reservoir fluid, the MMP value has been calculated for each of the modes. In order to do that, the gas has been combined with different proportion of gas condensate. In addition, by considering the reservoir pressure, the optimum injection composition in the reservoir oil has been determined. Finally, the sensitivity analysis has been carried out (or done) and implemented on the effective parameters which influence the gas injection process.

METHODOLOGY

Miscible gas injection is a proven method for increasing oil production, introduced since the 1960s [1]. The minimum pressure that the injection gas dynamically miscible in the reservoir oil is called minimum miscible pressure [2]. To investigate the miscible injection in a field, the minimum miscible pressure is one of the key

parameters [3]. Measuring MMP is one of the key steps in the gas injection process [4]. The use of miscible gas injection in reservoirs has increased rapidly [5]. Increasing the pressure improved miscibility pressure, but the operation cost increases [6]. MMP can also be defined as the minimum pressure in which all the oil displaced after injection of 1.2 pore volume of injected gas [7].

The simulation of slim tube has been fulfilled using Eclipse300. Moreover, requirement PVT model has been provided by Winprop, CMG Software. The model consists of 1200 block matrix with a porosity of 0.3 and permeability of 5 D in Cartesian coordinate. By considering fluid in this model, it contains 17 components.

The simulator results show that, under the same conditions, the miscibility pressure decreases with decreasing temperature. The minimum miscible pressure at the temperatures of 60 and 96 ° C was calculated to be 4850 and 5700 (psi). Figures 1 and 2 show the minimum miscible pressure value.

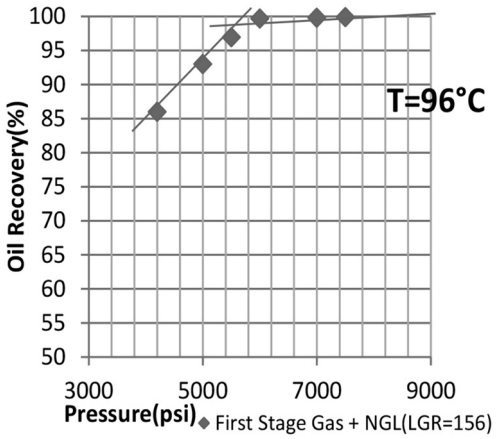

Figure 1: MMP calculation NGL(LGR=156).

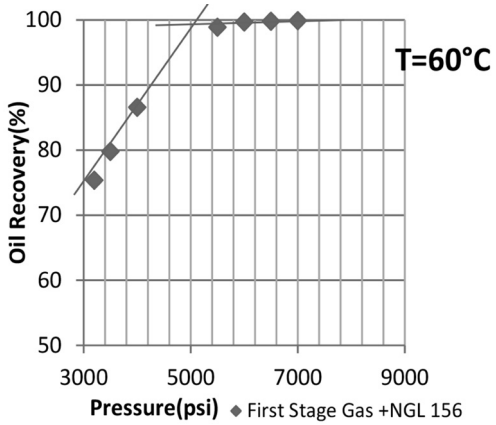

Figure 2: MMP calculation NGL(LGR=156).

DISCUSSION AND RESULTS

The main aim of this project is to simulate MMP experiment by Petrel (Eclipse 300) Software for eliminating laboratories' experiments and diminishing costs. Moreover, this method can be effectively used in miscible gas injection reservoirs.

CONCLUSIONS

In this study, the following results are obtained:

1- The rapid calculation of MMP without any requirement to slim tube experiment.

2- Comparing calculated MMP of various fluids with each other.

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