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方法技术

高温高压水洗物性变化实验研究——以塔里木轮南油田T_I油组为例

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Experimental study on physical properties after flooding under high temperature and high pressure condition: taking reservoir T_I of Tarim Lunnan Oil Field as an example

摘要 塔里木轮南油田T_I油组已有20年注水开发历史，近年对油藏开发过程中的水洗动用状况进行了一些研究，但所采用的实验手段均未在地层条件下进行。该文利用取自该油田的流体和岩心，进行高温高压下的水洗模拟实验，以弄清储层条件下油水渗流规律，研究储层长期水洗后微观孔隙结构、润湿性等变化特征。实验表明：水洗过后，岩心孔渗降低幅度随水洗倍数增加而略有增大，分选性变差；水湿性随水洗倍数增大而增强；相渗曲线的S_{wi}与S_{or}均增大，K_{rw}（S_{or}）降低，驱油效率降低；水洗后未形成大孔道，造成水提前突破的主要原因可能是T_I层内存在平面与纵向非均质性。

关键词： 高温高压 水洗 油气层物理 实验研究 油田开发 轮南油田

Abstract: The T_I reservoir of the Lunnan Oil Field in the Tarim Basin has over 20 years' development history. In recent years, the application situation of water flooding was researched, but was not in formation condition. In this paper,in order to figure out oil and water seepage law, and to study the reservoir alternations of micro-pore structure and wettability after long-term water flooding, we conducted a water flooding modeling experiment under high temperature and high pressure using fluid and core from this oil field. The experimental results showed that the reduction extent of porosity and permeability of cores increased as water flooding increased, and throats' sorting became weaker. Wettability also increased as water flooding increased. The irreducible water saturation and irreducible oil saturation values on core relative permeability curve rose while the water relative permeability under irreducible oil saturation dropped. Oil displacement efficiency decreased. High-capacity channels were not formed after water flooding. The main reasons for early water breakthrough might be plane and longitudinal heterogeneity.

Keywords: high temperature and pressure, water flush, physical properties of reservoir, experimental study, oil field exploration, Lunnan Oil Field

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