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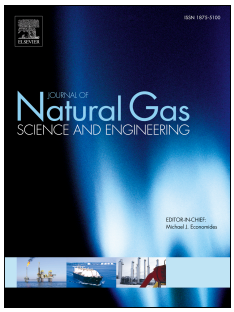

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Modeling of Gypsum Precipitation in Homogeneous and Heterogeneous Gas Reservoirs

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Abstract

Water injection into near dew point gas condensate reservoirs is a common method to delay the condensate dropout near the wellbore. Also water can be injected as waste water disposal into the depleted gas reservoirs or to increase the oil recovery in primary enhanced oil recovery process. All of these processes result in mixing of incompatible injection and formation waters which finally causes mineral scale formation. Gypsum is one of the most common mineral scales which is precipitated during the mixing of incompatible waters in porous media. This scale can reduce the reservoir rock permeability which affects the success of continuous water injection in hydrocarbon reservoirs. The mineral scale formation through the porous media can be determined if the suitable dispersion coefficient is estimated. Dispersion coefficient is already estimated by neglecting the effects of porous media or using unsuitable tracers which might affect the rate of scale precipitation. Two main issues have been investigated in this work. The first one is the development of an experimental method to measure the dispersion coefficient by a proper tracer which has no interaction with the other ions in porous media. The second one is modeling the concentrations of ions in porous media by two approaches. In this study the standard diffusivity equation and the capacitance approach are used to model the concentration profiles for all ions. The results of this work suggest the application of the capacitance model for the heterogeneous rocks and the standard diffusivity model for the homogeneous ones.

Key Words: Water Injection, Dispersion Coefficient, Mineral Scale, Incompatible Waters, Diffusivity Model, Capacitance Model

1- Introduction

Water injection is a common method for pressure maintenance or increasing the hydrocarbon recovery. If the mixed injection and formation water are incompatible, their reaction will cause

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