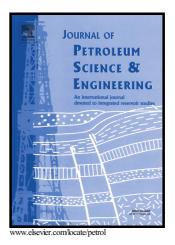
Author's Accepted Manuscript

Experimental analysis of calcium carbonate scale formation and inhibition in waterflooding of carbonate reservoirs

Azizollah Khormali, Dmitry G. Petrakov, Mohammad Javad Afshari Moein



 PII:
 S0920-4105(16)30510-1

 DOI:
 http://dx.doi.org/10.1016/j.petrol.2016.09.048

 Reference:
 PETROL3655

To appear in: Journal of Petroleum Science and Engineering

Received date: 18 June 2016 Accepted date: 27 September 2016

Cite this article as: Azizollah Khormali, Dmitry G. Petrakov and Mohamma Javad Afshari Moein, Experimental analysis of calcium carbonate scale formatio and inhibition in waterflooding of carbonate reservoirs, *Journal of Petroleun Science and Engineering*, http://dx.doi.org/10.1016/j.petrol.2016.09.048

This is a PDF file of an unedited manuscript that has been accepted fo publication. As a service to our customers we are providing this early version o the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain

Experimental analysis of calcium carbonate scale formation and inhibition in

waterflooding of carbonate reservoirs

Azizollah Khormali¹, Dmitry G. Petrakov¹, Mohammad Javad Afshari Moein²

¹Department of Oil and Gas Field Development and Operation, Oil and Gas Faculty, Saint Petersburg Mining University, Saint Petersburg, Russia, 199106 ²Geological Institute, ETH Zurich, Switzerland

Abstract

Deposition of inorganic salts such as calcium carbonate $(CaCO_3)$ can cause formation damage and production equipment failure during the development of a reservoir. In case of waterflooding, complex geochemical processes between the injection water, formation water and rock occur and the concentration of ions increases. Major contribution of scale control concentrates on understating the conditions scale formation and its inhibition.

In this paper, we analyze experimentally the effect of oil composition and flow conditions on $CaCO_3$ scale formation. We measured the induction period of $CaCO_3$ crystallization in a stirred vessel with different Reynold numbers and the interfacial tension at the boundary between the aqueous scale inhibitor and oil at different percentages of organic components. In addition, we determined the performance of $CaCO_3$ scale inhibition under different static and dynamic conditions in some Iranian carbonate core samples.

The experimental results showed that if the interfacial tension was reduced by increasing the concentration of organic components to 1.5 percent, the CaCO₃ precipitation decreases more than 30 percent. In addition, increasing the flow velocity (Reynolds number) had a great influence on the increase in the induction period of CaCO₃ crystallization. However, the induction period was insignificantly changed at higher values.

Using a recently developed scale inhibitor, we kept the $CaCO_3$ formation at a constant concentration of 30 mg/L. The efficiency of the inhibitor was insignificantly reduced if the

Download English Version:

https://daneshyari.com/en/article/8125874

Download Persian Version:

https://daneshyari.com/article/8125874

Daneshyari.com