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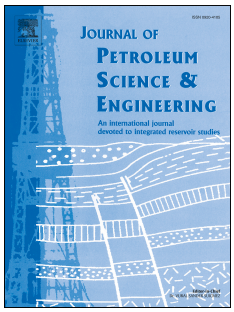

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Rituraj Singh, Vikas Mahto, Hari Vuthaluru

PII: S0920-4105(16)30857-9

DOI: 10.1016/j.petrol.2018.02.038

Reference: PETROL 4708

To appear in: *Journal of Petroleum Science and Engineering*

Received Date: 30 October 2016

Revised Date: 26 September 2017

Accepted Date: 14 February 2018

Please cite this article as: Singh, R., Mahto, V., Vuthaluru, H., Development of a novel fly ash-polyacrylamide nanocomposite gel system for improved recovery of oil from heterogeneous reservoir, *Journal of Petroleum Science and Engineering* (2018), doi: 10.1016/j.petrol.2018.02.038.

Development of a novel fly ash-polyacrylamide nanocomposite gel system for improved recovery of oil from heterogeneous reservoir

Rituraj Singh[a], Vikas Mahto[a*] and Hari Vuthaluru[b]

[a]*Department of Petroleum Engineering, Indian Institute of Technology (Indian School of Mines), Dhanbad-826004, India*

[b]*Australia – India Joint Research Centre for Coal and Energy Technology, Department of Chemical Engineering, Curtin University, GPO Box U1987, Perth 6845, Western Australia, Australia*

Abstract

Among all the available methods to reduce water production and to improve oil recovery from heterogeneous reservoirs, injecting a gelling system composed of a polymer and a crosslinker has been widely used. A novel nanocomposite hydrogels used to reduce excessive water production from heterogeneous reservoir was systematically analyzed. The nanocomposite used in this work was synthesized using nano fly ash and acrylamide by free radical polymerization and hydrogel was prepared by crosslinking a fly ash-polyacrylamide nanocomposite with chromium acetate. The bottle and breakthrough vacuum tests were conducted to gain insight into the gelation time and gel strength of nanocomposite hydrogel respectively. The effect of various parameters such as polymer concentration, crosslinker concentration, nano fly ash concentration and temperature on gelation time and gel strength was systematically evaluated. From the results, it was observed that the nanocomposite gel system has enough gel strength (0.045 MP) and acceptable gelation time (9-10 hours). In addition, sand pack flooding experiments revealed that the nanocomposite polymer gel has good plugging capacity at reservoir conditions (95.14% at 90^{o}C), indicating its potential to recover additional oil from matured oil fields having natural or induced fractures and permeability variations in the reservoirs.

Keywords: nanocomposite; nano fly ash; gel stability; plugging capacity; water control.