OXIDE NANOPARTICLES FOR DETERMINATION OF PETROLEUM PRODUCTION DISTANCE IN FORMATION

Mohd Zulkifli bin Mohamad Noor[1,*], Ivy Lam Yoke Chin[1], Sonny Irawan[2]

[1] *Faculty of Chemical & Natural Resources Engineering, Universiti Malaysia Pahang, 26300 Gambang, Pahang, Malaysia.*

[2] *Department of Petroleum Engineering, Universiti Teknologi PETRONAS, 32610 Bandar Seri Iskandar, Perak, Malaysia*
* Corresponding author: mzulkifli@ump.edu.my

Abstract

Nanoparticles exhibit unique physical properties and chemical properties and hence have received much attention from scientists and researchers in different areas of biological sciences. Nanoparticles are employed in a wide range of applications causing large quantities of these materials to be released into the environment. Yet, issues related to how and where these particles are released into the porous media still remain as major challenges. The objective of this research is directed towards the study of oxide nanoparticles transport in low porosity sand pack and determine the distance transport by the nanoparticles in the absence and presence of oil. The nanopowders were dispersed in de-ionized water and the horizontal column was packed with low porosity sand (30-40% porosity) of the size of 500 µm. This experiment was carried out with four different pore volume of nanoparticle suspensions ranging from 0.25 PV to 1.0 PV. The column effluents were analyzed using atomic absorption spectroscopy to determine the morphology of the elements existed in the effluents. The resistivity of four different sections (metal rod 1,2, metal rod 2,3, metal rod 3,4 and metal rod 1,4) were measured using a multimeter. The transport of nanoparticles was the smoothest in paraffin oil, followed by water. In the absence of paraffin oil, the conductivity and resistivity value in water were 0.022 S/m and 44.90 Ω.m respectively after 1.0 PV injection. In the presence of paraffin oil, the conductivity and resistivity reading were 0.026 S/m and 38.66 Ω.m respectively after 1.0 PV injection. This indicated that the transport of nanoparticles in the presence of oil had lower resistance compared to the resistance in the absence of oil and thus, the distance transported by nanoparticles in the presence of oil were longer compared to the distance transported in the absence of oil.

Keywords: *Oxide Nanoparticle Transport; Low porosity sand; Conductivity; Resistivity*