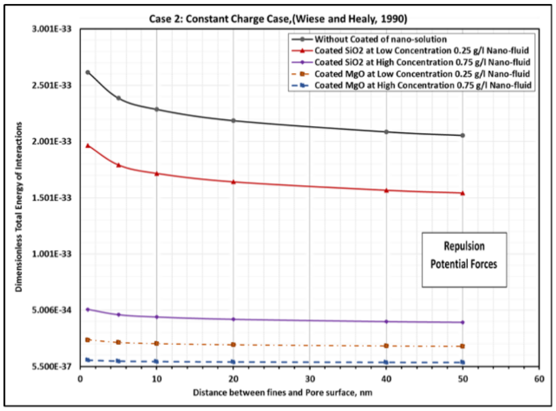

Figure 1. Result of dimensionless total energy of interaction are calculate and determine through double-layer potential for without coated (Reference Case -clear from nano-solution), coated SiO2 and MgO nano-solutions at low and high concentration 0.25, 0.75 gm

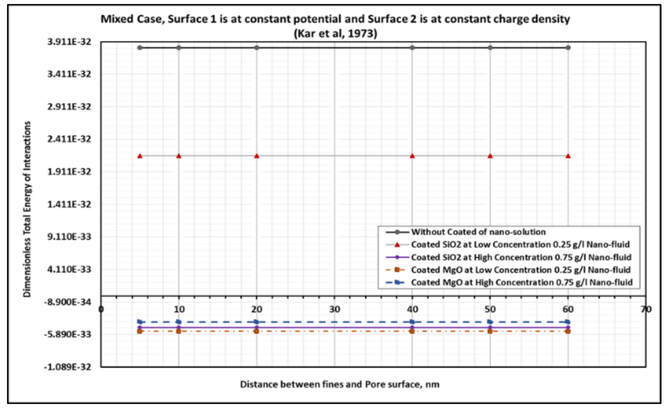

Figure 8. Result of dimensionless total interaction energy calculated and determined through double-layer potential without coated (Reference Case -clear from nano-solution), coated SiO2 and MgO nano-solutions at low and high concentration 0.25, 0.75 gm

The Figure 8 gives results for the electrostatic potential energy, which are intermediate between those for the constant surface potential and constant surface charge density cases. It was found that these calculations of electrostatic energy forces at different parameters such as on pore wall system in porous medium and fines particle.

Simple approaches are available to calculate the dimensionless total interaction energy forces with mixed case. It may be the negative sign accounts for used highest concentration SiO_2 nano-particle and medium concentration for MgO nano-particles that it is an attractive potential, while the reference case (without nano-particle) or low concentration SiO_2 nano-fluids, V_T represented by positive value as a result of the strong repulsion force, which is depend on the type of nano-fluids and nano-fluids concentration. Furthermore, it decays slowly and weak interaction energy between a pair of atoms especially slowly decaying of "London van-der Waals" repulsion force.

4. Conclusions

Two different types and concentrations of nanoparticles were used in this study. Silica dioxide and magnesium oxide nanofluids were used to treat Abu Rawash Sandstone to decrease fines migration and permeability reduction.

The zeta potential measurement, which represent the double-layer potential were used to calculate the total interactions of energy. The Zeta potential results investigated that Injection MgO NPs into the porous medium improves adsorption of fines compared with Sio_2 NPs. The adsorption of fines in case of MgO NPs reaches to 81.17% compared with the reference case. While in case of SiO_2 NPs reaches to 54.71%.

The calculation of the dimensionless total interaction energy between fines and separation distance confirmed the experimental result and showed that the attraction potentials and repulsion forces between fines and pore walls for separation of different distances and effect of coated nanoparticles were improved and compared with different cases in this study.

Total interactions energy shown that the nanoparticle of magnesium oxide with concentration 0.5 g/L has the highest efficiency to reduce fine migration by affecting the surface properties of coated fines onto the grain surfaces in porous medium. Finally, the adsorption efficiency of fines coated with nanofluids, shown that the different concentrations of magnesium oxide nanoparticles has the best ability to attach or contact fines on the grain surfaces compared with the other type used in the study (silica SiO_2).

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