
Mobilization of Quartz Fines in Porous Media

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Abstract: The onset of the mobilization of fine particles of quartz (fines) in sandpacks was determined by comparing the theoretically calculated hydrodynamic and colloidal forces acting on a fines particle near a representative sand grain. The results show that the mobilization of fines depends strongly on the chemistry of fluids present in the reservoir. Specifically, a critical electrolyte concentration exists for mobilization, which depends on the pH. For large particles of fines and relatively high fluid velocity, the mobilization of fines may depend on the fluid velocity, but in a narrow range of electrolyte concentration. The types of interactions between the fines and sand grain surfaces were corroborated by direct visual observations using a traveling microcell pack.

The mobilization of fines in sandstones leads to a reduction of permeability (i.e., a reduction of the hydraulic conductivity).

Key Words: Colloidal forces • Fines particles • Electrolyte concentration • Hydrodynamic forces • Mobilization • Porous media • Quartz

Clays and Clay Minerals; December 1988 v. 36; no. 6; p. 491-497; DOI: [10.1346/CCMN.1988.0360602](https://doi.org/10.1346/CCMN.1988.0360602)

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