Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Emulsions Droplet Capture Mechanism in Porous Media KHALIL ZEIDANI, MARCEL POLIKAR, University of Alberta — This study was undertaken to investigate the physics of emulsion flow in porous media. The objective of experiments were to study the applicability of oil-in-water emulsion as a plugging agent in the vicinity of the well bore for thousands of Canadian gas wells that are continuously leaking gas to surface. The motion of oil droplets and the capture mechanisms were investigated through visualized experiments. Well-characterized emulsions were injected into a micro model resembling a two parallel plate model packed with glass beads. Effects of emulsion properties and wettability of the medium were studied on a plugging mechanism. The results demonstrate the reduction in permeability mainly due to droplets size exclusion compared to the pore constrictions. Also, smaller droplets may lodge and coalesce in pores crevices thereby accelerating the blockage process. Moreover, more viscous emulsions are more effective compared with the less viscous ones due to combined effects of capillary and viscous forces. The deposition of droplets was adjusted through utilizing different preflush solutions. Criteria were set for enhancing emulsion penetration depth thereby defining the extent of the blocked region. In conclusion, this work characterizes the physics of emulsion flow in porous media and demonstrates its application as a novel sealant in near well bore region. The novelty, which constitutes a step-change in technology, is a method that emplaces an emulsion at a desired location in underground media.

Khalil Zeidani
University of Alberta

Date submitted: 23 Feb 2006 Electronic form version 1.4