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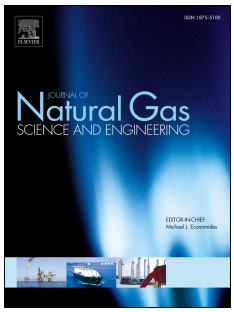

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Quantifying Regain Conductivity in Proppant Packs Using Broken Na-CMC Fracture Fluid

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Abstract

An experimental study was performed with the scope of quantifying the regain fracture conductivity in a proppant-packed API RP-61 conductivity cell which was prior injected with broken Carboxyl Methyl Cellulose (CMC) fracture fluid.

The initial fracture conductivity measurement was done on a proppant-packed (30/50 CARBOprop type) API RP cell using water as test fluid. A zirconate crosslinked CMC fracture fluid was prepared and broken with sodium persulphate solution. After breaking fluid to water-like viscosity in hot water bath for about 17 hours, it was injected into the API cell to measure the conductivity. Regain fracture conductivity was again measure by flushing the cell with water in a reverse direction. Results were compared with broken hydroxylpropyl guar (HPG). Scanning electron microscope image of proppant samples before and after were done to validate the result above.

Results from the experiments showed that there was a significant regain in conductivity in the use for broken CMC fracture fluid when compared with HPG. CMC showed a regain fracture conductivity of about 96% while HPG showed a regain fracture conductivity of about 75.6%. The result indicated that HPG produced higher residue which blocked the pore spaces in the proppant pack and thereby causing more damage and reducing fracture conductivity. CMC on the other hand produced less damage and residue in proppant pack, therefore excellent regain fracture conductivity was achieved. The SEM image experiments performed on proppants samples showed evidence of residue from the broken HPG fluid blocking the pores. After flushing with water, there were still significant amount of residue adhering to the proppant particles. However, SEM images containing CMC fluid showed fewer residues and less adhesion of residue fragments to the proppant particles after flushing with water. The result from this research work was found to be very rich because of the way we matched/compare the SEM result with the regain fracture conductivity test. This comparative process was able to validate the reason why there was excellent regain fracture conductivity in use of CMC fracture fluid.

Keywords: *Fracture conductivity; Proppants; Regain fracture Conductivity; Scanning electron microscope; Residue;Carboxylmthyl cellulose.*