COMPARATIVE STUDY BETWEEN GUAR AND CARBOXYMETHYLCELLULOSE USED AS GELLING SYSTEMS IN HYDRAULIC FRACTURING APPLICATION

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ABSTRACT

Guar gum and its derivatives are the most frequently used thickening agents in hydraulic fracturing. They account for possibly 90% of all gelled fracturing fluids. Carboxymethylcellulose (CMC) has little use today in hydraulic-fracturing applications. Due to uncertainty in guar availability, CMC is being recommended as an effective polymer alternative in hydraulic-fracturing applications. In order to evaluate this option, a comparative study was conducted between guar and CMC performance as gelling agents in hydraulic fracturing.

CMC can be an effective alternative to guar and as this study illustrates can minimize formation and proppant pack damage. Furthermore, the critical overlap concentration, C* was determined as an indicator of crosslinkability at low polymers concentration for both guar and CMC.

This study was also conducted in order to evaluate the effect of several breakers (ammonium persulfate, sodium persulfate and enzymes) on linear polymer and crosslinked gel systems degradation. Viscosity, particle size distribution and regain conductivity were measured as a function of breaker type and concentration. Design schedules of hybrid fracturing jobs performed with CMC and guar in similar completion conditions in the Permian Basin were reported.

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