



A Review of Linear Gel Fracturing Fluids

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Abstract

Linear gel is prepared by treating bio-diesel with various water samples collected from different water bodies. The new biodiesel based linear gel was employed in the recovery of oil wells through hydro fracturing and pilot tests were conducted for the first time. Viscosity of gel was measured at various bottom hole-circulating temperatures and it was found to vary from 32 to zero dial reading in the range of 45°C to 60°C. Gel was observed to break at 45°C and 60°C in 120 minutes. So, the final temperature was selected as 60°C for the application of gel for coal bed methane (CBM) wells. It was observed that higher levels of salinity in water helped in optimum utilization of gel in real time application.

Keywords: Bio-diesel, Linear gel, Slick water, Hydro fracturing, Guar polymer gel, Breaker

Introduction

Hydraulic fracturing deals with pumping of gallons of fluid into oil or gas well at high pressure to induce fractures in the rock formation facilitating the liberation of oil or gas.^{1,2} Until now, drinking water has always been the source of hydro fracturing operation. However, this strategy found to be different problems including water shortage and contamination.³⁻⁵ Therefore, it is Important to develop a hydro fracturing method with not only recovery of water and decrease the water contamination but also capable to avoid microorganism's contamination. Recently, polymers gel based fracturing methods developed to avoid above mentioned problem. The polymers gel based fracturing fluid undergoes enzymatic attack by the aerobic bacteria present in the base water.^{6,7} Unless controlled, the growth of microorganism will make the polymer as non-functional. Therefore, biocides/bactericides are added to minimize the bacterial contamination in the base water.^{8,9} Currently, fossil diesels are normally used in the preparation of linear and cross-link gels, which are environmentally harmful and wasteful of natural resources.^{10,11} Using fossil diesel in the preparation of frac concentration, results in the release of harmful and contami-

nated carbon dioxide fumes that promotes the global warming condition which is a major drawback. Research reports that vegetable bio-diesel can be used as a substitute for fossil diesel.^{12,13} The findings that were presented suggest that Biodiesel, an alternative eco-friendly fuel synthesized from "Jatropha seed".¹⁴ This research work explored to develop alternate methods for hydro fracturing process, which are feasible and eco-friendly. Pilot tests were also conducted for the first time by using the bio-diesel as the alternate fuel and are found to be more economical. Successful execution of pilot tests of the frac operations and the fruitful results are detailed. When compared with fossil diesel XLFC, the bio-diesel XLFC shows better and improved results for on-shore and off-shore fracturing operations.¹⁵⁻¹⁸

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Quick Response Code:



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Conflicts of Interest

Authors declares that there is no conflict of interest.

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