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***The Effect of Fracturing Fluid on the Breakdown Pressure during Hydraulic Fracturing Treatment in Tight Hydrocarbon Reservoirs***

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**Extended Abstract:** Hydraulic fracturing is one of the effective techniques to increase the recovery factor and oil and gas production in reservoirs with low permeability, which is still subject to uncertainties. One of the important parameters in hydraulic fracturing operations is the pressure of fracture initiation or formation breakdown in reservoirs with tight rocks and low porosity and permeability (less than 10% and 0.1-1 mD, respectively). In this study, the effect of type of fracture fluid (viscosity) on the breakdown pressure was studied by performing laboratory experiments on tight sandstone samples and comparing them with shale specimens. The results showed that there is an effective relationship between the viscosity of injection fluid and breakdown pressure. By increasing the fracturing fluid viscosity, a significant increase was observed in the breakdown pressure. Also, by increasing the viscosity of the fracturing fluid, the width and height of the fractures were increased.

**Keywords:** *Fracturing Fluid, Breakdown Pressure, Hydraulic Fracturing, Tight Hydrocarbon Reservoirs*

**Summary:** In this study, the effect of type of fracturing fluid (viscosity) on the breakdown pressure was studied by performing laboratory experiments on tight sandstone samples and comparing them with shale specimens.

**Introduction:** Breakdown pressure of a rock formation is the pressure at which a fracture will be created in the formation. Determination of breakdown pressure and fracture analysis is important for drilling operations in the areas of Leak-Off Test (LOT) analysis, casing design and for hydraulic fracturing treatments in the area of mini frac analysis and determination of the horse power required. It is important to determine the breakdown pressure during hydraulic fracturing operations, which is considered as one of the most effective operations to increase the recovery factor in hydrocarbon reservoirs. The type of fracturing fluid can be played a key role on the amount of breakdown pressure during hydraulic fracturing.

**Methodology and Approaches:** This study was conducted based on laboratory tests on samples obtained from sandstone outcrops. The objective of this study is to investigate the effect of fracture fluid types on breakdown pressure during hydraulic fracture operations in tight sandstone reservoirs. A novel experimental setup was used to study the effect of fracture fluid types on the sandstone's breakdown pressure and the created fracture complexity. Designing of fracturing fluid is a crucial part of the hydraulic fracturing treatments. For a fracture fluid to be effective, several factors are to be considered. In order to investigate the effect of fracturing fluid on the breakdown pressure, six types of fluid were considered with different viscosities.

**Results and Conclusions:** The results showed that there is an effective relationship between the

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