

## **Effect of TERGITOL NP-9 and PEG-10 Oleyl Phosphate as Surfactant and Corrosion Inhibitor on Tribo-Corrosion Performance of Carbon Steel in Emulsion-Based Drilling Fluids**

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**Abstract :** Emulsion-based drilling fluids containing mineral oil are commonly used for drilling operations, which generate a lubricating film to prevent direct contact between moving metal parts, thus reducing friction, wear, and corrosion. For long-lasting lubrication, the thin lubricating film formed on the metal surface should possess good anti-wear and anti-corrosion capabilities. This study aims to investigate the effects of two additives, TERGITOL NP-9 and PEG-10 oleyl phosphate, acting as surfactant and corrosion inhibitor, respectively, on the tribo-corrosion behavior of 1018 carbon steel immersed in 5% KCl solution at room temperature. A pin-on-disc tribometer attached to an electrochemical system was used to investigate the corrosive wear of the steel immersed in emulsion-based fluids containing the surfactant and corrosion inhibitor. The wear track, surface chemistry and composition of the protective film formed on the steel surface were analyzed with an optical profilometer, SEM, and SEM-EDX. Results of the study demonstrate that the performance of the emulsion-based drilling fluids was significantly improved by the corrosion inhibitor by a remarkable reduction in corrosion, coefficient of friction (COF) and wear.

**Keywords :** corrosion inhibitor, emulsion-based drilling fluid, tribo-corrosion, friction, wear

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