

**Development of Novel Cost-Effective Pour Point Depressant (PPD) for Ultra Low Sulfur Diesel (HP PPD ULSD)****HP PPD ULSD: A Novel Cost-Effective Pour Point Depressant (PPD) for Ultra Low Sulfur Diesel**

Diesel fuel is a complex hydrocarbon mixture composed of n-alkanes (C8–C28) and iso-paraffins. At low temperatures, the solubility of normal (i.e. linear) alkanes in diesel is reduced and the normal alkanes crystallize, which leads to a decrease in the fluidity of diesel, and blocks pipelines, filters and nozzles of diesel engines. At present, many methods have been developed to improve the low-temperature fluidity of diesel. Using pour point depressants (PPDs) is internationally recognized as the most effective and simple method for solving the cold fluidity issues of diesel fuels due to its low cost, low dosage requirements, and convenient operation. PPDs, known as cold flow improvers (CFI) reduce the pour point (PP) and cold filter-plugging point (CFPP) of diesel fuel by modifying the size and shape of the wax crystal lattices.

HPGRDC developed a novel cost-effective pour Point Depressant (PPD) to meet the winter and specialty diesel pour point specification (pour point < -30 °C). A series of methacrylate copolymers were synthesized and used as PPDs for diesel fuel. Based on lab scale results, best formulation was scaled up to 10 MT. The trial was conducted from 9th to 28th Feb 2023 at MR FRE unit. The average pour point of 30 ULSD batches during the HP PPD ULSD trial period was -3°C. In a similar period, the benchmark PPD average pour point was observed to be only 0 °C at similar dosage. During the trial window the average cold filter plugging point (CFPP) was found to be 0.7 °C which is lower than the benchmark PPD i.e. 2.4 °C, indicating the higher efficiency of HP PPD ULSD.

Performance comparison of HP PPD ULSD vs benchmark PPD monitored over 30 ULSD batches