

Comparative Study of the Thermal Properties of Different Grades of Engine Oils at Various Temperatures by Addition of Fullerene (C₆₀) Nano-Particles

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The quality and properties of engine oil play a crucial role in the case of efficiency of car motors where such oil is involved in lubrication and cooling of internal combustion of engines. The thermal properties of engine oil are the key parameters when selecting engine oil for a vehicle. The objective of this research work was to compare the effect of fullerene-C₆₀ (99.5%) nano-particles on the thermal properties of 10W30, 20W40, and 20W50 CALTEX red engine oil. In this study, the effect of nano-particle concentration 0.01 wt% on different grades of engine oils was examined at different temperature values (30 – 120 °C). The nano-fluid was prepared using the two-step direct mixing method. A magnetic stirrer (40 °C/200 rpm) and an ultrasonicator (Rocker, SONER 210H, AC, 220V, 50Hz) were used to distribute the nano-particles uniformly in the base fluids. The thermal properties, namely, thermal conductivity, thermal diffusivity and volumetric heat capacity of the base fluids and nano-fluids, were measured using the Flucon LAMBDA thermal conductivity meter (TECHNE UCAL 400⁺ dry-block calibrator, Germany) while the flash point was measured using the flash point tester (Anton Paar PMA500, Germany). It was concluded that a considerable enhancement of the flash point can be observed. However, the other thermal properties were not shown such enhancements.

Keywords: Engine Oils, Fullerene (C₆₀), Nano-fluid, Thermal properties