

عنوان مقاله:

Investigation the flow, thermal, physical and stability behavior of lubricant oil filled nanoparticles

محل انتشار:

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خلاصه مقاله:

This work studies the effect of nanoparticles (NPs) on the flow, thermal, physical properties and stability of engine oil. The controlling on the viscosity, flash, fire point and thermal conductivity is essential issue to improve the engine oil performance. Recently, the nanoparticles can be used as additives to the engine oil to enhance its properties. The graphite (Gr) and zinc oxide (ZnO) NPs with main diameter of 40 nm were mixed with the SAE 20W50 oil using magnetic stirrer and sonication process. Cone-plate viscometer and KD2 probe (transient hot wire) are used to check the effect of NPs concentrations and temperature increasing on the dynamic viscosity and thermal conductivity behavior. SYD3536 flash point apparatus is used to test the flash and fire point due to the NPs concentrations increasing. The surface tension, density and stability after five months also tested. The results indicated that the higher concentration of NPs, the better properties of the nano-oil. The flash and fire point generally increase with the NPs concentration increasing. The Gr nano-oil generates higher flash and fire point than that of ZnO nano-oil. The dynamic viscosity produces a slight change due to NPs concentration increasing at different temperatures especially at 40°C for both nano-oils. At temperatures over 40°C the viscosity increases with the NPs concentrations increasing, while below 40°C the viscosity decreasing. The thermal conductivity increases with the NPs percentage and temperatures increasing, where the Gr nano-oil produces the higher value than that of ZnO nano-oil. A small change in the surface tension and density is observed due to the additives increasing. The measured viscosity and thermal conductivity after five months show a high stability of both nano-oils.

کلمات کلیدی:

Flow behavior, Nano-oil, Viscosity, Thermal conductivity, Stability

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