

Preparation and Characterization of CuO Nanofluids for High Temperature Applications

Abdul Razak Kaladgi*, Asif Afzal, Mohammed Kareemullah and Ramis M K
P.A. College of Engineering, India

Preparation and characterization of CuO base Nanofluid for high temperature applications is reported in this paper. CuO Nano particles are dispersed in different base fluids like water (W), ethylene glycol (EG), 70% W+30% EG, 50% W+50% EG and 30% W+70% EG. The concentration of Nano particles are varied from 0.025 to 0.125 volume concentration (vol. %). 25 samples of required Nanofluids are prepared using ultrasonication method. The thermal conductivity at room temperature and viscosity of the prepared nanofluid at 200 °C to 800 °C is estimated using a KD2 probe thermal analyser and Brookfield rheometer respectively. Results indicate that the viscosity trend is fluctuated by vol. % for different base fluid combinations and thermal conductivity is severely affected for the same. The maximum thermal conductivity is observed at 0.1% of Nano particle concentration for all base fluid combinations and a maximum increment of 20% is observed with respect to standard working fluid water. A 50% decrement in viscosity is also observed for water based CuO Nanofluid at 80 °C with respect to standard working fluid water at room temperature. The conclusions from the various studies in this paper give an insight towards optimising the volume concentration of CuO nanoparticles and its base fluid composition, which simultaneously improve heat transfer rate and reduce pumping power, that can be used for high temperature applications without phase transition due to the presence of low volatile ethylene glycol in the base fluid volume concentration are used in detail.

Keywords: Nanofluids, Reynolds number, sonification, viscosity, copperoxide, thermal conductivity