

## Effects of Working Temperature on Thermo-Physical Properties and Forced Convection Heat Transfer of TiO<sub>2</sub> Nanofluids in Water – Ethylene Glycol Mixture

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### ABSTRACT

Nanofluids as a new coolant have overcome the limitations in thermal performance faced by conventional fluids such as water, ethylene glycol (EG) and oil based fluids. The objective of the study is to investigate the properties and heat transfer performance of TiO<sub>2</sub> nanofluids in water-EG mixture at different operating temperatures. The study is carried out through experimental determination on heat transfer coefficient of TiO<sub>2</sub> nanofluids in a circular tube under turbulent flow. The thermal conductivity and viscosity measurements were undertaken for temperature in the range of 30–80 °C. The maximum enhancement of thermal conductivity achieved was 15.4% at 1.5 vol% concentration and temperature of 60 °C. The relative viscosities fluctuate at a range of 4.6–33.3% with variation of temperature. The Nusselt number showed an enhancement up to 22.8% and 28.9% for temperatures of 50 °C and 70 °C, respectively. The friction factor for the nanofluids is slightly increased with concentration. Thermal conductivity, viscosity and heat transfer coefficient of TiO<sub>2</sub> nanofluid are strongly influenced by working temperature and concentration.

**KEYWORDS:** Thermal conductivity; Viscosity; Heat transfer; TiO<sub>2</sub> nanofluids; Water-ethylene glycol

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