

## Determination of Thermophysical Properties of Water Based Magnetic Nanofluids

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**Abstract :** In this study, it was aimed to determine the thermophysical properties of two different magnetic nanofluids (NiFe<sub>2</sub>O<sub>4</sub>-water and CoFe<sub>2</sub>O<sub>4</sub>-water). Magnetic nanoparticles were dispersed into the pure water at different volume fractions from 0 vol.% to 4 vol.%. The measurements were performed in the temperature range of 15 °C-55 °C. In order to get better idea on the temperature dependent thermophysical properties of magnetic nanofluids (MNFs), viscosity and thermal conductivity measurements were made. SEM images of both NiFe<sub>2</sub>O<sub>4</sub> and CoFe<sub>2</sub>O<sub>4</sub> nanoparticles were used in order to confirm the average dimensions. The measurements showed that the thermal conductivity of MNFs increased with an increase in the volume fraction as well as viscosity. Increase in the temperature of both MNFs resulted in an increase in the thermal conductivity and a decrease in the viscosity. Based on the measured data, the correlations for both the viscosity and the thermal conductivity were presented with respect to solid volume ratio and temperature. Effective thermal conductivity of the prepared MNFs was also calculated. The results indicated that water based NiFe<sub>2</sub>O<sub>4</sub> nanofluid had higher thermal conductivity than that of the CoFe<sub>2</sub>O<sub>4</sub>. Once the viscosity values of both MNFs were compared, almost no difference was observed.

**Keywords :** magnetic nanofluids, thermal conductivity, viscosity, nife<sub>2</sub>o<sub>4</sub>-water, cofe<sub>2</sub>o<sub>4</sub>-water

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