International Journal of Mechanical Engineering (IJME)
ISSN (P): 2319-2240; ISSN (E): 2319-2259
Vol. 6, Issue 1, Dec - Jan 2017; 11-20

International Academy of Science, Engineering and Technology
Connecting Researchers; Nurturing Innovations

HEAT TRANSFER ENHANCEMENT BY USING CUO-WATER NANOFLUID IN A CONCENTRIC TUBE HEAT EXCHANGER- AN EXPERIMENTAL STUDY

V. MURALI KRISHNA

Department of Mechanical Engineering, B. V. Raju Institute of Technology,

Narsapur, Medak, India

ABSTRACT

In industries such as power generation, chemical production, air conditioning, transportation, and microelectronics the cconventional heat transfer fluids such as water, mineral oil, and ethylene glycol are used to transfer heat from one fluid to another. The low thermal conductivity of conventional fluids increase the size of the heat transfer device for the given heat transfer. So there is a need to develop energy-efficient heat transfer fluids that are required in a plethora of heat transfer applications. Modern materials technology provided the opportunity to produce nanometer-sized particles which are quite different from the parent material in mechanical, thermal, electrical, and optical properties. The heat transfer properties of these conventional fluids can be significantly enhanced by dispersing nanometer-sized solid particles such as Al_2O_3, Cu, CuO and Fe_2O_3. The suspended nano-sized metallic and metal oxide particles change the transport properties and heat transfer characteristics of the base fluid. Thus the preparation of nanofluids using metal and metal oxide nanoparticleswill play an important role in developing the next generation of cooling technology. The CuO nanoparticles are prepared by adopting sol-gel techniquein the present work. The CuO nanoparticles are prepared from copper nitrate by passed it through different stages such as dissolving, preparation of solution, formation of gel, filtration and drying to get the nano-sized CuO particles. The nanoparticles are sintered for 3 hours at a temperature of 200^0C in the furnace to remove the liquid traces completely from nanoparticles. TheCuO-water nanofluids are prepared at different volumetric concentration of CuO nanoparticle in the base fluid. To find the heat transfer rates of CuO -water nanofluid for different Reynolds numbers and for different volume fractions of nano-particles in the base fluidthe experiments are conducted in a double pipe counter flow heat exchanger. The experimental overall heat transfer coefficients calculated are compared with the base fluid water. Also the theoretical overall heat transfer coefficients of CuO-water nanofluid are determined by evaluating the physical and thermal properties of nanofluid with the correlations available in the literature.

KEYWORDS: CuO-Water Nanofluid, Double Pipe Heat Exchanger, Enhancement of Heat Transfer, Sol-Gel Method