

## Entropy Generation Analysis of Cylindrical Heat Pipe Using Nanofluid

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**Abstract :** In this study, second law of thermodynamic is employed to evaluate heat pipe thermal performance. In fact, nanofluids potential to decrease the entropy generation of cylindrical heat pipes are studied and the results are compared with experimental data. Some cylindrical copper heat pipes of 200 mm length and 6.35 mm outer diameter were fabricated and tested with distilled water and water based Al<sub>2</sub>O<sub>3</sub> nanofluids with volume concentrations of 1-5% as working fluids. Nanofluids are nanotechnology-based colloidal suspensions fabricated by suspending nanoparticles in a base liquid. These fluids have shown potential to enhance heat transfer properties of the base liquids used in heat transfer application. When the working fluid undergoes between different states in heat pipe cycle the entropy is generated. Different sources of irreversibility in heat pipe thermodynamic cycle are investigated and nanofluid effect on each of these sources is studied. Both experimental and theoretical studies reveal that nanofluid is a good choice to minimize the entropy generation in heat pipe thermodynamic cycle which results in higher thermal performance and efficiency of the system.

**Keywords :** heat pipe, nanofluid, thermodynamics, entropy generation, thermal resistance

**Conference Title :** ICSRD 2020 : International Conference on Scientific Research and Development

**Conference Location :** Chicago, United States

**Conference Dates :** December 12-13, 2020