

Development of Nanorefrigerants for Various Types of Refrigerant based: A Comprehensive Review on Performance

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ABSTRACT

Nanorefrigerants and nanolubricants are formed when nanoparticles are dispersed in refrigerant/lubricant based. The use of nanorefrigerants or refrigerant with nanolubricant mixtures is one of the passive techniques in enhanced heat transfer performance and reducing energy consumption. This paper reviews the augmentation of heat transfer, enhancement of coefficients of performance (COP) and energy efficiency of various nanoparticle dispersions in the refrigerants or lubricants based on refrigerant type. From the results available in the literatures, it shows that nanorefrigerants and refrigerant/nanolubricant mixtures enhances the heat transfer coefficient. Furthermore, the augmentation of heat transfer coefficient depends on the concentrations and size of the particles. Increment of concentration also increases the viscosity, and consequently, the pressure drop. Moreover, from the review, most of the researchers tend to use R134a hydrofluorocarbon (HFC) as the refrigerant base. Even though the use of chlorofluorocarbon (CFC) refrigerant had been banned, it is still favored by some researchers as it is easy to prepare the nanorefrigerant mixtures in a liquid state with atmosphere pressure and room temperature. The limited research of nanorefrigerants in using hydrocarbon (HC) refrigerant base is due to its flammability issues. Nevertheless, it is strongly suggested that the research based on this environmental friendly refrigerant such as HC need to be conducted extensively..

KEYWORDS: Nanorefrigerant; Nanolubricant; Heat transfer enhancement; Refrigerant base

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