

Future Trends of Natural Refrigerants: Selection, Preparation and Evaluation

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ABSTRACT

The field of refrigeration technology has played a pivotal role in modern society, providing essential cooling solutions for various industries, including food preservation, healthcare, and manufacturing. However, the conventional refrigerants used in these systems, such as hydrofluorocarbons (HFCs) and chlorofluorocarbons (CFCs), have been identified as major contributors to climate change and ozone depletion. Recently, the heightened environmental consciousness of the refrigeration industry paved the way for searching for natural refrigerant (NR) as an alternative to the usual commercial and synthetic refrigerant (SR). Natural refrigerants are known to be substances that occur naturally in the earth's surroundings and were commonly used while synthetic refrigerants took their place because of their known better thermal performance durability and safety. Despite challenges such as flammability and toxicity, these NR substitutes demonstrate competitive performance urging a transition from traditional SR. In this review paper, commonly known NR such as ammonia, carbon dioxide, air, and hydrocarbons, were presented in terms of their sustainable characteristics, historical origins, selection criteria, preparation techniques, evaluations, and impacts. To provide a sustainable and eco-friendly guideline for the advancement of refrigeration technology, this analysis examines the trends, selection criteria, preparation processes, and evaluation procedures of different NRs. Finally, the results presented in this paper will be useful baseline information for both researchers and scientists in developing a refrigeration system.

Keywords: natural refrigerants; refrigeration; safety; environmental impact