Performance Comparison of Domestic Refrigerator using HFC134a and HFC134a/HC Refrigerant Mixture

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Abstract

An experimental performance comparison study on domestic refrigerator system was conducted and compared with HFC134a and M09 (HFC134a and HC blend (containing 55.2%HC600a and 44.8%HC290 by weight)) mixture refrigerant. The domestic refrigerator system was initially designed to operate with HFC134a.Experimental results showed that the refrigeration capacity of the refrigerant M09 mixture system had 20.6% higher than R134a system at 32ºC atmosphere condition. It was observed that the M09 showed a faster cooling rate than R134a. The COP of M09 mixture system was 7.2% to9.16% higher than R134a system. A reduction in pull down time percentage in the refrigerator Freezer, chiller, Food, Crisper was observed to be about 24.34%, 11.11%, 1.91%, and 7.90 % for M09 system. In per day energy consumption of M09 system was 2.1%lesser than HFC134a system. The temperature variation along the evaporator coil was less than 2.7 ºC. The M09 mixtures cool the system 6 minutes earlier than the HFC134a due to its higher heat transfer characteristics. The overall performance has proved that the above M09 refrigerant mixture could be the best long term alternative to phase out R134a.

Keywords
Mixture; Refrigerant; R134a; Hydrocarbon.