

PERFORMANCE INVESTIGATION OF DOMESTIC REFRIGERATOR USING R600 AND LIQUEFIED PETROLEUM GAS

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ABSTRACT

This paper compares the performance of hydrocarbon refrigerant R600 with liquefied petroleum gas (LPG) in a one horse power vapour compression refrigerator. The refrigerator was equipped with type-T thermocouples and pressure gauges for the measurement of temperatures and pressures in the cycle of the refrigerator. The thermocouples were attached at the compressor suction, discharge, condenser outlet and at the evaporator inlet. The pressure gauges were installed at the discharge line and at the condenser exit for the measurement of high side pressures while another ones were installed at the suction line and the evaporator inlet for the measuring the low side pressures. The refrigerator was first charged to optimum capacity with the R600 and temperature and pressure readings were taken for 3 hours at 10 minutes interval. The same was done for the LPG after the refrigerator was allowed to sufficiently cool and purged of the R600 for the same time frame. The results showed that the refrigerator was charged to optimum capacity with 100g R600 while it was 50g for the LPG. The evaporator temperature for R600 was lower than that of LPG resulting in a higher compression discharge temperature than LPG. Higher refrigerating effect was obtained for R600 alongside an average coefficient of performance higher than LPG. Generally, the performance of R600 and LPG are quite similar but the overall best performance is obtained using R600. It is therefore concluded that R600 recorded a better performance because of its high latent heat as a single refrigerant. But the LPG being a mixture of hydrocarbon refrigerants with each component with its own latent made it register relatively a lower performance in the refrigerator.

Keywords: Performance, evaporator, domestic refrigerator, R600, Liquefied petroleum gas.