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### 1 Generalized Correlation for the Condensation and Evaporation Heat Transfer Coefficients of Propane (R290), Butane (R600), R134a and R407c in Porous Horizontal Tubes: Experimental Investigation

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**Abstract:**

This work is an experimental study on the heat transfer characteristics and pressure drop of different refrigerants during the condensation and evaporation processes in porous media. Four different refrigerants (R134a, R407C, 600a, R290), with different porosities were used to reach a real understanding of the actual heat transfer characteristics and pressure drop when using porous material inside the condenser and evaporator. Steel balls were used as porous media with different porosities (38%, 43%, 48%). The main goal of this project is to enhance the heat transfer coefficient during the condensation and evaporation processes when using different refrigerants and different porosities. Different correlations for the heat transfer coefficient and the pressure drop of the different refrigerants were developed. Also a generalized empirical correlation was developed for the different refrigerants. The experimental and predicted heat transfer coefficients and pressure drops were compared. It was found that, the Absolute standard deviation for the heat transfer coefficient and the pressure drop not exceeded values of 15% and 20%, respectively.

**Keywords:** condensation, evaporation, porous media, horizontal tubes, heat transfer coefficient, propane, butane

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