Influence of wire fin on performance of coiled tube heat exchanger in a small J-T refrigerator

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Abstract

Heat exchangers are the most critical components that dictates the performance of the small J-T refrigerators. Using mixture of refrigerants as a working fluid in these type of heat exchangers will takes place boiling and condensation simultaneously and gives more pollution free environment. Designing and evaluating the temperature distributions of these wire finned heat exchanger is not available. With this aim in the present study a coiled wire finned heat exchanger is used to cool the mixed refrigerant down to cryogenic temperatures. The modified Granryd [12] model was used to estimate the heat transfer coefficients on tube side and shell side respectively. It was predicted that the size of the heat exchanger required reduces by 20% when a wire fin was wound over the inner tube.

Keywords: J-T refrigerator, wire fin, coiled tube heat exchanger, cryogenic temperature.

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