

Methods for Continuous, Non-Invasive Measurement of Mixture Composition in Mixed Refrigerant Joule-Thomson Cryocooler

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The shift between the composition of a mixed-refrigerant charged into the system and the composition during its operation is a known phenomena in a MR JT cryocooler. This phenomenon introduces significant uncertainty in measurement and analysis of MRJT cryocoolers. This can also significantly affect the performance of the cryocooler. Currently, the most popular and widely used method is probing the mixture and analyzing it on the gas chromatograph, however this method influences the remaining portion in the system. This method is also valid only for the given moment of probing and it is not suitable for continuous measurements which are critical for analysis of transient phenomena. This paper presents and compares different methods for continuous estimation of a binary mixture composition focusing on a density-measurement method using the Coriolis Mass-Flow meter. Although the single method allows for estimation of a binary mixture, it is possible to determine the composition of more complex MR by combination of different methods.