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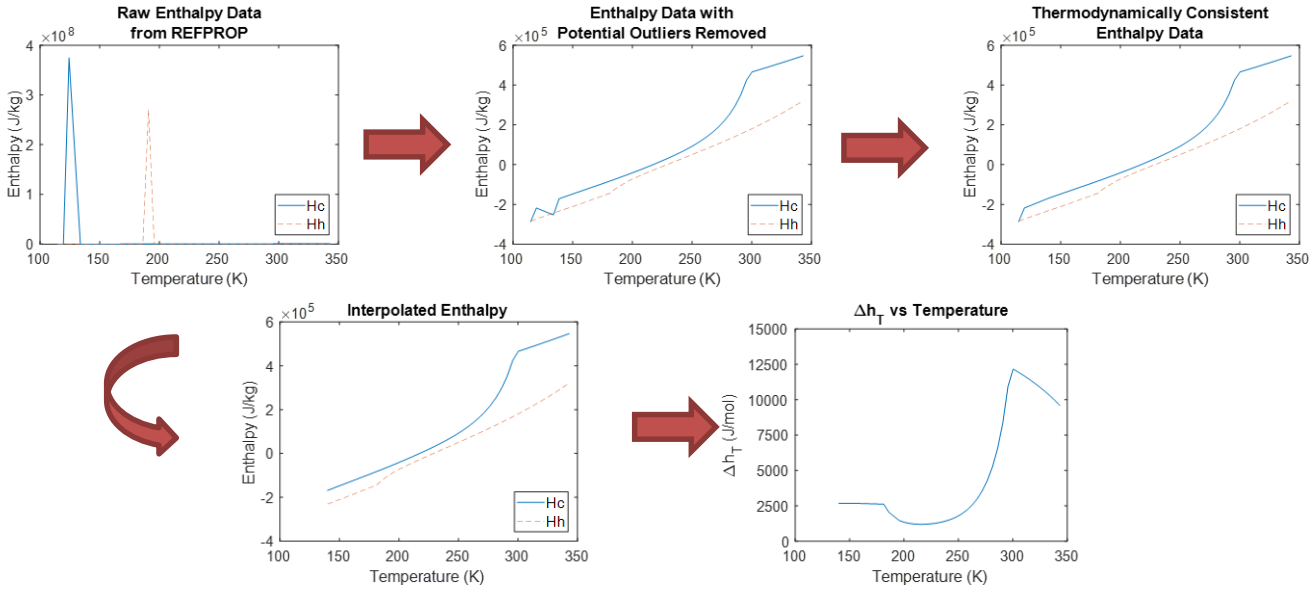
Background

- The Joule-Thomson cooling effect results from expansion of a non-ideal gas through a valve and is a common technique for achieving cooling at cryogenic temperatures.
- Optimal gas mixtures can provide lower temperatures and higher cooling power than is possible with a pure substance.
- Selecting gas mixtures and JT cycle parameters to meet specific cryogenic cooling loads is a challenging design problem.

Goals and Objectives

- We have developed a computational tool to optimize mixture composition and operating parameters for a mixed gas JT system with operating parameters ranging from 110K to above room temperature.
- We have designed and assembled a JT crycooler prototype.
- We will compare experimental and optimization results to further develop the mixture optimization model for increased accuracy of the optimal mixture composition.
- We will design and assemble future prototypes for further experimental testing.

Model Visualization & Prototype



Visualization of five-step process for determining minimum Δh_T for composition of a three-component mixture.

A SOLIDWORK CAD software rendering of JT cryocooler and a picture of assembly.