Title: Modeling the Integrated Thermal Amine Scrubber and Air Cooled-Temperature Swing Adsorbent Compressor

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As part of a larger CO_2 removal architecture study, a model was developed in Aspen Custom Modeler of the Thermal Amine Scrubber (TAS), an ISS flight experiment intended to scrub CO_2 from the cabin air. In order to minimize mass losses, it was determined the TAS should work in conjunction with the Air Cooled-Temperature Swing Adsorption Compressor (AC-TSAC) to reduce the CO_2 for O_2 production. First the TAS removes CO_2 from the cabin atmosphere, then the AC-TSAC compresses the CO_2 and feeds it in a steady steam to a Sabatier or Bosch process. This document details an effort to add a model of the AC-TSAC to the existing TAS model to determine if the two hardware systems will have deleterious effects on each other's performance. It was found the AC-TSAC provided sufficient vacuum for the TAS's desorption to occur, but not the same level of vacuum as space vacuum. This lower quality vacuum led to a reduction in the total cyclical uptake capacity of the TAS and thus a lower CO2 removal under the same conditions. The TAS did not remove enough CO2 to fill the AC-TSAC bed to capacity during the production phase which caused the AC-TSAC to run out of CO2 during production. This renders the addition of the AC-TSAC pointless. It is believed these effects can be overcome with a redesign of one or both systems.