

Challenges of Life Support/Medical Support for Human Missions (8)
Challenges of Life Support/Medical Support for Human Missions (2) (2)

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DEVELOPMENT OF CRYOGENIC AIR PURIFICATION FOR DEEP SPACE APPLICATIONS

Abstract

Deep space exploration and settlement represents a new frontier for the progress of mankind. From the first stratospheric flight to the Apollo missions to the International Space Station and in the near future sustainable life on the moon, the occupancy and duration of flights have risen exponentially. It has put increasing demands on life support systems capabilities. Currently adsorbent beds allow trapping of H₂O and CO₂ rejected by Astronauts. Technologies. Another possible means of trapping these compounds is based on cryogenic freezing. H₂O, CO₂ and VOC are simply sequestered by cooling down the air down each molecules dew point. Air Liquide has developed a versatile breadboard in collaboration with Airbus and ESA to assess several concepts and technologies for cryogenic trapping. A set of breadboards has been built to compare performances between using Counter Flow and Regenerative Heat Exchanger/Crystallizers. In this presentation we will present the underlying concepts of Cryogenic Air purifications, preliminary test results, and our development plan perspectives. While not all technological hurdles have been cleared to date, Cryogenic Air Purification appears as a promising path for next generation life supports system. Furthermore, the Technology could also see application for In Situ Resource Utilization, specifically Lunar water purification