

Carbon Dioxide Reduction Post-Processing Sub-System Development

The state-of-the-art Carbon Dioxide (CO₂) Reduction Assembly (CRA) on the International Space Station (ISS) facilitates the recovery of oxygen from metabolic CO₂. The CRA utilizes the Sabatier process to produce water with methane as a byproduct. The methane is currently vented overboard as a waste product. Because the CRA relies on hydrogen for oxygen recovery, the loss of methane ultimately results in a loss of oxygen. For missions beyond low earth orbit, it will prove essential to maximize oxygen recovery. For this purpose, NASA is exploring an integrated post-processor system to recover hydrogen from CRA methane. The post-processor, called a Plasma Pyrolysis Assembly (PPA) partially pyrolyzes methane to recover hydrogen with acetylene as a byproduct. In-flight operation of post-processor will require a Methane Purification Assembly (MePA) and an Acetylene Separation Assembly (ASepA). Recent efforts have focused on the design, fabrication, and testing of these components. The results and conclusions of these efforts will be discussed as well as future plans.