

DEVELOPMENT OF THE VOLATILE MONITORING OXYGEN MEASUREMENT SYSTEM

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Oxygen production is vital on the Moon for astronaut's survival and in-situ resource utilization technology developments. One of the primary processes under investigation at Kennedy Space Center to extract oxygen from the Lunar regolith is Molten Regolith Electrolysis. This process heats regolith to about 1500 degrees Celsius and performs electrolysis to separate oxygen from the compounds in the melt. Therefore, there is a need for a technology capable of measuring the amount of oxygen produced during electrolysis. Researchers at Kennedy Space Center designed and developed the Volatiles Monitoring Oxygen Measurement System (VMOMS). It can also be used for other oxygen extraction processes. The technology monitors volatiles that evolve out of the reactor during the evacuation, heating, and electrolysis phases. It also detects and quantifies the amount of oxygen produced during electrolysis. In addition to its primary task, it has a safety feature to keep the oxygen producing reactor below 5 psig. All data on the system: percent of oxygen produced, pressure, temperature, and gas flow rate are logged via LabVIEW programming.

Here the authors report on the development of the VMOMS technology and the results of utilizing the system during an MRE test. The findings will also include modifications of the technology, in real-time during use, due to instantaneous changes in the Molten Regolith Electrolysis process. The system main sensors are two zirconia sensors (for oxygen quantification), residual gas analyzer (volatiles detection), and gas

chromatography.

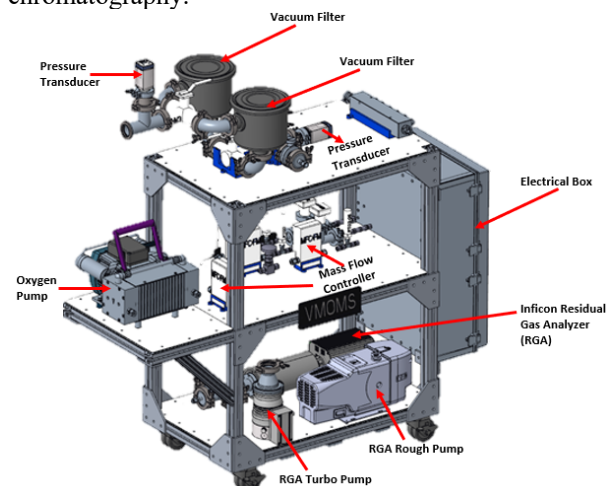


Figure 1. Volatile Monitoring Oxygen Measurement System