Paper ID: 74121
student

25th IAA SYMPOSIUM ON HUMAN EXPLORATION OF THE SOLAR SYSTEM (A5)
Interactive Presentations - 25th IAA SYMPOSIUM ON HUMAN EXPLORATION OF THE SOLAR SYSTEM (IP)

Author: Ms. Farah Youssef
Taiwan Space Agency (TASA), United Arab Emirates

MAIN SYSTEM ELECTROLYSIS AND PURIFICATION FOR A 60KG LUNAR ROVER(MSEP60) TEST FOR EFFECT ON WATER CONTENT

Abstract

NASA has identified that the correct place for landing and using critical extraction methods of water purification was near lunar poles and near-permanently shadowed regions (PSRs). Our research has also identified that to extract efficient water concentrations our rover will land near icy regolith to the superficial heterogenous mixtures of breccias and basalts. We have also identified that extraction of water near frequent meteor collision areas is a suitable place to extract water as glassy regolith is formed near them with percentages of ice concentrations from 0 to 11

Due to meteorite collisions and Regolith Strength To measure material load-penetrations the regolith-sample encountered and its effects in the ice and water concentrations such as temperatures, we will start testing the mixtures as homogeneous by adding water. Compression at 10.9 cm of diameter using stainless steel test rings will be used at a force of 467 kN (simulating meteorite lunar collision compression by adding a force). Then placing the sample to cool it down in liquid nitrogen at negative 196 degrees Celsius. These temperatures will be measured consistently making sure they were at constants so no new products would be formed using the type K thermocouple. Type K Thermocouples are temperature sensors that can immerse, be placed at the surface or as a wire for a sensor or cable. They can measure temperatures from -270 to 1260 degrees Celsius and in addition are quite the revamp for accuracy and inexpensiveness. We propose to use them as they can withstand the fluctuating temperatures of the moon. Using an electro-hydraulic closed loop; plates were used to compress the sample by using a 19mmdiameter hemispherical indenter at 1.24mm/sec. This melted the intergranular ice of the regolith sample .

Tubular reactors are where a given quantity of lunar regolith is placed inside to heat the regolith from the reactor walls in continuous flow. We will use tubular reactors from the Parr instrument company offering two-phase flow in counter-current flows attached to a catalytic bed material for our heterogeneous reaction. During pre-heating of the regolith, it will maintain the reagent to be collided with the wall. In terms of efficiency, the system allows for adjustable features. Our tubular reactors are scaled down at an internal diameter of 20cm and a length at 35cm. For backup systems to avoid harmful catalytic dust we will vent operations in dry atmospheres. We will be using ammonia as a scrubber and water polisher to contain and filter the water in the purification systems before regolith compression. Ammonia will be stored in the purge line which will include a shut-off valve, filter, metering valve and a back-flow/double check valve