

## **STEADY STATE COMPOSITION WITH LOW Fe<sup>2+</sup> CONCENTRATIONS FOR EFFICIENT O<sub>2</sub> PRODUCTION BY "MAGMA" ELECTROLYSIS OF LUNAR SOILS**

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### **Abstract**

Parameters are estimated for a hypothetical, well stirred, continuous-feed electrolytic cell that converts 20% of a lunar soil feedstock to O<sub>2</sub> gas, 26% to Fe-Si metal, 13% to spinel, and 41% to slag. Advantages of a molten Fe-Si cathode for trapping metal on reduction, a relatively conductive steady-state composition in equilibrium with spinel (a proposed container material), and close electrodes (<1 cm cathode-anode distance) are discussed. To produce 1 tonne of O<sub>2</sub>, ~6 MHW of energy are required for the electrolysis and IR heating within the melt, and another ~6 MWH may be introduced as waste heat through internal resistance of the electrodes. Thus, to produce 1 tonne of O<sub>2</sub> per 24 hours, ~0.5 MW of power delivered to the cell would be required.