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*The Reduction of Perchlorate in Mars Regolith Using Hydrogen Gas to Produce Chloride and Water*

If humans successfully travel to Mars, it would be necessary for them to grow consumable plants in Mars regolith as a source of nutrients. Mars regolith contains perchlorate, a toxin that has detrimental effects to human health, at hazardous concentrations of 0.5% - 1.0%. The goal of this experiment is to reduce perchlorate in Mars regolith using hydrogen gas so that plants grown in regolith would be consumable. Mars regolith simulant with 1%, 0.7%, and 0.5% concentrations of perchlorate was placed in Erlenmeyer flasks whose atmospheres were replaced with hydrogen gas. The flasks were allowed to sit for 72 hours for the reaction between hydrogen gas and perchlorate to occur. The reaction was not successful because perchlorate is stable and will not release its oxygen unless a catalyst is present to help stabilize the oxygen once it is released. In order to allow the reaction to occur, solid titanium dioxide, a catalyst, was mixed into three samples of regolith with 1% concentrations of perchlorate, and the mixtures were put into Erlenmeyer flasks. A wire was placed across the surface of the regolith with 10V of electricity passing through it, and the atmosphere was replaced with hydrogen gas at 1.5 atm of pressure. The flasks sat for 72 hours so that the reaction could fully occur. This study was successful in decreasing the concentration of perchlorate in Mars regolith so that future astronauts could grow consumable plants without toxic perchlorate on Mars utilizing Mars regolith as soil.