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A Closer Look at the Upper Monterey Shale: A SEM-EDS and Geochemical Analysis

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Geological storage of hydrogen (H_2) in depleted oil and gas reservoirs have become a much more prominent solution to lowering carbon dioxide emission to the atmosphere. California's central valley has various depleted reservoirs that provide promising pore space to geologic storage due to their pre-established capacity and favorable geologic conditions for injection processes. The caprock, which is of low permeability and low porosity, serves as a barrier above the reservoir rock that prevents injected gas from leaking. Previous research indicates that the H_2 can trigger redox reactions with a number of iron and sulfur bearing minerals under geologic storage conditions. These minerals, such as pyrite, are at an increased focus due to their capability to react with the injected H_2 and create Hydrogen Sulfide (H_2S). This reaction can also cause further mineral dissolution, which may create pathways through the caprock that will leak gas as well as cause new fractures or reactivate preexisting ones. This study aims to characterize and analyze the interactions between H_2 and caprock samples from southern San Joaquin Basin and monitor the reactions to prolonged exposure to H_2 through Scanning Electron Microscopy Energy Dispersive X-ray Spectroscopy (SEM-EDS).

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