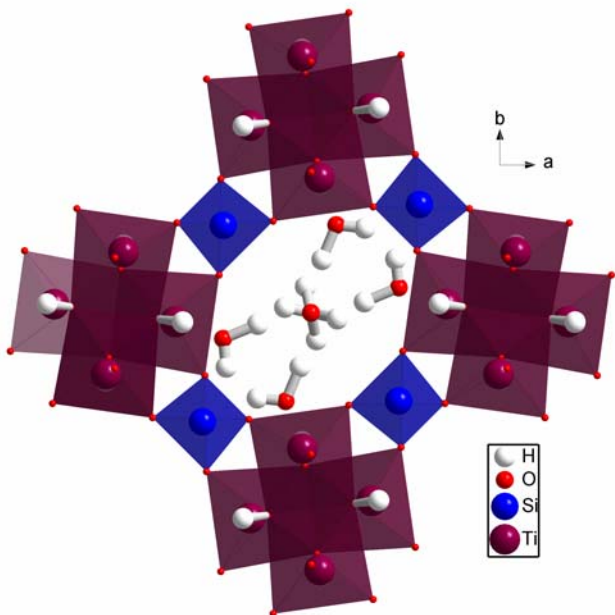


Porous titanium silicates for the selective removal of Cs⁺ from radioactive waste repositories

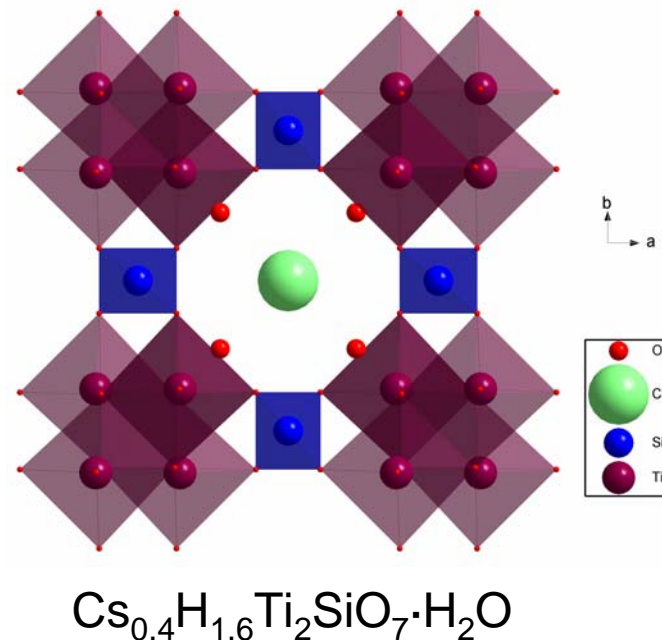
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¹³⁷Cs⁺ Sequestration

Our goal is to characterize chemically resistant materials to safely and permanently remove Cs⁺ and other decay products from radioactive waste tank facilities. Titanium silicates have shown to be selective for Cs⁺ and resistant to decomposition in the low pH and high γ -radiation environments present at waste storage sites.



(left) Hydrogen titanium silicate (H-TS) was used as the starting material for ion exchange. Only water is present in the 1-dimensional channels. (right) Cesium hydride titanium silicate (Cs-TS) after 40% replacement of H⁺ by Cs⁺.



Upon Cs⁺ exchange into H-TS, water is displaced from the channel as well as H⁺ from the TiO₆ groups. The channel distorts from an elliptical geometry (left) to a circular geometry (above) creating an accessible bonding environment for Cs⁺ to occupy. This structural transformation effectively immobilizes Cs⁺ in the center of the channels.