

The occurrence of perchlorate salt in and around the Taklimakan Desert, China

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The formation and preservation of perchlorate (ClO_4^-) in arid and semi-arid deserts on Earth is of growing concern, because the desert could serve as a viable analog for Martian landscape where high perchlorate has been recently discovered. In this study, perchlorate in samples collected from the Taklimakan Desert, Xinjiang, NW China was extracted by water and then measured by IC-MS/MS. The Cl speciation was determined by Cl K-edge XANES analysis to provide direct spectroscopic evidences for the presence of perchlorate. Results showed that the moraine sample contains a higher perchlorate concentration and the $\text{ClO}_4^-/\text{Cl}^-$ ratio in comparison with sand, river sediment and loess samples. Furthermore, KClO_4 was identified as the dominant perchlorate species in the hotspot of moraine sample by μ -XANES analysis, which is significantly different from the dominant presence of $\text{Ca}(\text{ClO}_4)_2$ and $\text{Mg}(\text{ClO}_4)_2$ species on Martian soil. This result could be explained by the lowest solubility for KClO_4 , while other perchlorate salts would be easily leached and mobile on Earth in contrast to Mars where much lesser liquid water is present in the history and present-day. Thus, the finding in this study would provide important insights into the prevalence of perchlorate on Mars.

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