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Abstract

Laboratory Chemistry of the Outer Solar System

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Ices on planetary satellites of the outer Solar System are characterized by a variety of compositions, temperatures, and radiation environments. The dominance of H₂O in a majority of known icy surfaces suggests that this molecule strongly influences the radiation chemistry and spectroscopy. On the other hand, some colder objects have N₂-rich ices containing CH₄. These have a different set of radiation-chemical products and different surface spectra. The Cosmic Ice Laboratory at NASA Goddard Space Flight Center simulates the low temperature, radiation environment of space and studies the chemistry and spectra of relevant ices and ice mixtures. A brief review of what we knew about the ice chemistry of the outer solar system 50 years ago, where we are now, and where we are going will be discussed.