

Experimental Measurements of Dissociative Recombination Relevant to Planetary Atmospheres

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Dissociative recombination (DR) is the primary mechanism for electron loss in the atmospheres of Mars and Venus. Within these atmospheres, oxygen is the most abundant molecular ion and is produced in a wide range of vibrationally excited levels by the reaction of atomic oxygen ions with carbon dioxide. Present knowledge of oxygen DR is limited to the ground vibrational level and to an uncharacterized distribution of excited vibrational levels. Measurements of the DR cross section and product distribution of individual vibrational levels are made at the heavy-ion storage ring in Stockholm (CRYRING) using a high pressure electron-impact ion source to produce controlled vibrational distributions in the molecular ion beam that are fully characterized by observing the products of dissociative charge transfer of the ions in cesium vapor. We will present our initial experimental measurements on oxygen and their relationship to the planetary atmospheres.

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