Abstract Submitted
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HCl^+, H_2Cl^+, DCl^+, D_2Cl^+ dissociative recombination, 300-500 K.[1] THOMAS M. MILLER, JUSTIN P. WIENS, NICHOLAS S. SHUMAN, ALBERT A. VIGGIANO, Air Force Research Laboratory, Kirtland AFB, NM — We have used a flowing afterglow Langmuir probe apparatus to measure dissociative recombination (DR) rate coefficients at 300-500 K for HCl^+, H_2Cl^+, DCl^+, and D_2Cl^+. For 300 K, we find 7.7 x 10^{-8} cm^3/s (HCl^+), 2.6 x 10^{-7} cm^3/s (H_2Cl^+), and 1.1 x 10^{-7} cm^3/s (D_2Cl^+), each with about 35% accuracy. The DR rate coefficient for DCl^+ is too slow for us to measure, especially in the face of dealing with mixed H/D species formed in apparatus feedlines when introducing DCl. DR rate coefficients are needed in modeling chlorinated species in diffuse interstellar molecular clouds,[1] though at much lower temperatures than we can reach. Cl^+ exists in diffuse clouds because IE(Cl) <IE(H), so Cl is not shielded from starlight UV by the abundant H. Cl^+ is exothermic to form HCl^+ in collision with H_2, and a second collision is exothermic to yield H_2Cl^+. Storage ring experiments[2] should yield product branching for the DR reactions. The reaction cycle is repeated from Cl neutrals produced in the DR process. 1. D. A. Neufeld and M. G. Wolfire, Astrophys. J. **706**, 1594 (2009). 2. O. Novotný, et al., Astrophys. J. **777**, 54 (2013).

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Thomas M. Miller
Air Force Research Laboratory, Kirtland AFB, NM

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