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Ternary recombination of H_3^+ , H_2D^+ , HD_2^+ , and D_3^+ with electrons in He/Ar/ H_2 / D_2 gas mixtures¹ ABEL KALOSI, PETR DOHNAL, RADEK PLASIL, Charles University in Prague, Prague 18000, Czech Republic, RAINER JOHNSEN, University of Pittsburgh, Pittsburgh, PA 15260, USA, JURAJ GLOSIK, Charles University in Prague, Prague 18000, Czech Republic — The temperature dependence of the ternary recombination rate coefficients of H_2D^+ and HD_2^+ ions has been studied in the temperature range of 80–150 K at pressures from 500 to 1700 Pa in a stationary afterglow apparatus equipped with a cavity ring-down spectrometer. Neutral gas mixtures consisting of He/Ar/ H_2 / D_2 (with typical number densities $10^{17}/10^{14}/10^{14}/10^{14}$ cm^{-3}) were employed to produce the desired ionic species and their fractional abundances were monitored as a function of helium pressure and the $[\text{D}_2]/[\text{H}_2]$ ratio of the neutral gas. In addition, the translational and the rotational temperature and the ortho to para ratio were monitored for both H_2D^+ and HD_2^+ ions. A fairly strong pressure dependence of the effective recombination rate coefficient was observed for both ion species, leading to ternary recombination rate coefficients close to those previously found for (helium assisted) ternary recombination of H_3^+ and D_3^+ .²

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