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Collisional quenching reaction rate coefficients of $N_2(A^3\Sigma_u^+)$ by C_2F_6 and C_3F_8 SUSUMU SUZUKI, MASARU KUBOAKI, HARUO ITOH, Chiba Institute of Technology — The collisional quenching reaction rate coefficient of $N_2(A^3\Sigma_u^+)$ by various air pollutant gases [1,2] were determined from the measurement of the effective lifetime of $N_2(A^3\Sigma_u^+)$in pure N_2 (5-nine) with a small amount of air pollutant gases as an admixture. Derivation of the rate coefficient was performed the waveform analysis of the transient ionization current after turning off the UV light in the Townsend discharge. In this paper, we report that the obtained collisional quenching reaction rate coefficients of $N_2(A^3\Sigma_u^+)$ by C_2F_6 and C_3F_8 are (2.3 $\pm$ 1.8) $\times$ 10^{-15} cm^3/s and (1.6 $\pm$ 0.8) $\times$ 10^{-14} cm^3/s, respectively. Furthermore, we investigate the relationship between the rate coefficient and the mass number of their quenching molecular gases. Firstly, it is confirmed that the rate coefficient take large value with an increase in the mass number of the quenching gases. Secondly, if H atom is included in the gas molecules such as CH_4, C_2F_6 and C_3F_8 the rate coefficient take large value, but if the molecules including F atom such as C_2F_6 and C_3F_8 instead of H atom in this study, more smaller values of the collisional quenching reaction rate coefficient are observed.

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[2] S. Suzuki, H. Itoh, Europhysics Conference on Atomic and Molecular Physics of Ionized Gases XXII, P2-03-03 (2014)

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