Collisional quenching reaction rate coefficients of \( N_2(A^3\Sigma_u^+) \) by \( \text{C}_2\text{F}_6 \) and \( \text{C}_3\text{F}_8 \) 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 \( \text{C}_2\text{F}_6 \) and \( \text{C}_3\text{F}_8 \) are \((2.3 \pm 1.8) \times 10^{-15} \text{ cm}^3/\text{s}\) and \((1.6 \pm 0.8) \times 10^{-14} \text{ cm}^3/\text{s}\), 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 \( \text{H} \) atom is included in the gas molecules such as \( \text{CH}_4 \), \( \text{C}_2\text{F}_6 \) and \( \text{C}_3\text{F}_8 \) the rate coefficient take large value, but if the molecules including \( \text{F} \) atom such as \( \text{C}_2\text{F}_6 \) and \( \text{C}_3\text{F}_8 \) instead of \( \text{H} \) atom in this study, more smaller values of the collisional quenching reaction rate coefficient are observed.