INTERNAL STATE DISTRIBUTIONS OF PRODUCT OH AND NO FROM PHOTODISSOCIATION OF NITRIC ACID AT 193 NM

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The distributions of vibrational, rotational, spin-orbit and lambda -doublet states of nascent NO and OH are obtained using the A-X transition of both OH and NO via the technique of laser-induced fluorescence. NO is produced from the secondary dissociation of fragment NO_2 from nitric acid after photolysis at 193 nm. About 3% of available energy is distributed to rotation of OH fragment; no vibrational excited OH was observed. It was found that about 87.7% of excess energy to be directed to the internal energy of fragment NO_2. According to the measurement of internal state distributions of secondary product NO, the partition of energy in NO $X^2\Pi$ is calculated to be 840 cm^{-1} in vibration and 1410 cm^{-1} in rotation. The spin-obit state $^2\Pi_{1/2}$ of NO is populated about twice of that in $^2\Pi_{3/2}$ for the vibrational levels v=0,1,2. The measured populations of vibrational states v=0,1,2 are 0.75, 0.19 and 0.07, respectively ; these populations agree with result calculated with the statistical model, prior theory. The experimental data indicate that although NO_2 photochemical from nitric acid , was proposed to be in an electronically excited state, the state distribution of NO from unstable NO_2 agree with those from NO_2 excited with monochromatic light in the UV-vis range after average for the broad distribution of internal energy. Hence this unknown electronic state of NO_2 is expected to be coupled to the ground electronic surface then leading to dissociation.