DISTRIBUTION OF INTERNAL STATES OF CO AND OH FROM O(^{1}D) + C_6H_6 AND C_6D_6 DETERMINED WITH TIME-RESOLVED FOURIER-TRANSFORM SPECTROSCOPY

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Rotationally resolved infrared emission spectra of CO ($1 \leq v \leq 6$) in the spectral region 1800 – 2350 cm^{-1} and OH ($1 \leq v \leq 3$) in the region 2800 – 3700 cm^{-1} were recorded with a step-scan Fourier-transform spectrometer. CO shows a rotational distribution corresponding approximately to temperatures 1520 K for v = 1 and 860 K for v = 2 – 6, with an average rotational energy of 9 ± 1 kJ mol^{-1} at the earliest applicable period (2.5 – 7.5 μs) upon photolysis. Extrapolation to time zero based on data in the range 2.5 – 27.5 μs yields an average nascent rotational energy of 14 ± 4 kJ mol^{-1}. Observed vibrational distribution of CO corresponds to a vibrational temperature of 5800 ± 330 K and an average vibrational energy of 33 ± 3 kJ mol^{-1}. OH shows a rotational distribution corresponding to temperatures 550 K for the P1 branch (v = 1 – 3) and 620 K for the P2 branch (v = 1 – 3), with an average nascent rotational energy of 4 ± 1 kJ mol^{-1}. The observed vibrational temperature of OH is 4830 ± 230 K, corresponding to an average vibrational energy of 21 ± 4 kJ mol^{-1}. The branching ratio of [CO]/[OH] is 2.1 ± 0.1 for O (^{1}D) + C_6H_6 and no OD was observed from O (^{1}D) + C_6D_6. The significant deuterium isotope effect will be discussed.