SPECTROSCOPIC IDENTIFICATION OF NEW AROMATIC MOLECULAR RADICALS IN CORONA DISCHARGE: α-METHYLBENZYL RADICAL

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We have applied the technique of corona excited supersonic expansion (CESE) to identify new aromatic molecular radicals. Recently, we have succeeded in observing the spectroscopic evidence of α-methylbenzyl radical in the gas phase. The precursors, toluene, ethylbenzene, and isopropylbenzene seeded in a large amount of inert carrier gas helium have been electrically discharged in a CESE using a pinhole-type glass nozzle. The visible vibronic emission spectra observed clearly show many vibronic bands originating from the transition from the D_1 to D_0 states of benzyl-type radicals. The spectra obtained from each precursor were compared to identify the spectroscopic evidence of new aromatic molecular radicals. By postulating the decomposition pathway of precursors, we could confirm that the breaking off the C-H bond of the -CH_2- of ethylbenzene produces α-methylbenzyl radical, which is the first spectroscopic evidence in any spectral region.