CAVITY RINGDOWN SPECTROSCOPY OF THE $\tilde{A} - \tilde{X}$ ELECTRONIC TRANSITION OF ALKYL PEROXY RADICALS: THE BIG PICTURE

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Alkyl peroxy radicals ($C_nH_{2n+1}O_2$) are key components in the low temperature oxidation of hydrocarbons. This is a critically important process that affects both the quality of our atmosphere and the efficiency of our automobiles. In an effort to paint a big picture of these alkyl peroxy radicals, we have combined the cavity ringdown spectroscopic data of the $\tilde{A} - \tilde{X}$ electronic transition for the first (methyl peroxy) through fifth (pentyl peroxy) members of this homologous series. By doing this, we are able to develop a systematic understanding of the spectroscopy of this electronic transition, namely what influence a change in the structure of the alkyl peroxy has on the location and structure of its electronic spectrum. Likewise, we can identify trends from the smaller species' experimental results, which will aid in making predictions for the spectroscopy of larger alkyl peroxies (i.e. 6, 7, and 8 carbon atoms), since we anticipate that these predictions based on our experiments will be much more reliable than those obtained from *ab initio* calculations of these larger systems. In addition, we can do some benchmarking to determine what are "good" calculations for these systems by comparing experiment and theory for the C_1-C_5 alkyl peroxy radicals.