ROTATIONAL SPECTROSCOPY OF OXYGEN BEARING RADICALS AND RADICAL COMPLEXES

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We have been studying reactive free radicals and radical complexes by menas of Fourier transform microwave (FTMW) spectroscopy by detecting their rotational transitions. A large number of elusive species have been successfully produced in a supersonic jet using a pulsed discharge nozzle system. Quite recently, several oxygen bearing free radicals and radical complexes have been observed, motivated by atmospheric chemistry because reactions in the earth's atmosphere are more or less oxydation reactions with various oxygen bearing species being involved.

Since the frequency coverage of our FTMW spectrometer is limited to the cm-wave region below 40 GHz, a double resonance system has been developed to extend the observable frequencies to the mm-wave region. The double resonance technique enabled us to oberve higher frequency transitions for these species. Furthermore, the method was found to be quite powerful to make unambiguous assignments of the transitions and the detected species.

Several new results, including detections of peroxide and trioxide monomer radicals and radical complexes, will be presented. Their structures and other features will be discussed based on the experimental results supplemented by relatively large scale *ab initio* calculations performed in our laboratory. Most of the detected species are considered to be quite important to understand atmospheric chemistry.