EXPERIMENTAL DETERMINATION OF THE ENERGETIC LOCATION OF THE LOWEST LYING ELECTRONICALLY EXCITED STATE OF H_3O RYDBERG RADICAL

MICHAEL H. COHEN, WAN YONG FENG, ELLEN GUNDLACH, and JAMES V. COE, *Department of Chemistry, The Ohio State University, Columbus, OH 43210-1173.*.

The lowest lying electronic state of H_3O Rydberg radical is determined to lie 2.3 eV above the ground state. This result has been obtained by studying the reaction $H_3O^+ + OH^-$ in the gas phase as a function of center-of-mass collision energy using electrostatically merged ion beams. The rate constant of this reaction was measured as a function of center-of-mass collision energy and put onto an absolute scale by calibrating it to the reaction $O^+ + O^-$ and using Landau-Zener (LZ) absorbing sphere theory. When applying LZ absorbing sphere theory to ion-ion recombination reactions, one important parameter is the location of electronically excited states of the neutral products. It is this dependence that has allowed an *experimental* determination of the location of the lowest lying electronic state of H_3O Rydberg radical.