NEUTRAL RADICAL RADIATIVE ASSOCIATION

JESSICA DAWN TENNIS, *Chemistry, University of Virginia, Charlottesville, VA, USA*; J.-C. LOISON, *Université de Bordeaux, Institut des Sciences Molécualires, Bordeaux, France*; ERIC HERBST, *Department of Chemistry, The University of Virginia, Charlottesville, VA, USA*.

Dimethyl ether and other complex organic molecules are found at higher concentrations in a variety of cold interstellar sources than can be explained by current production mechanisms in chemical models. With the use of microcanonical phase space theory, the radiative association rate coefficient between the methyl and methoxy radical to form dimethyl ether is found to be on the order of 10^{-10} cm^3 s^{-1} at temperatures relevant to the cold interstellar medium (ISM). This is nearly equal to the collisional rate, which can be on the same order of magnitude, for these two radicals, indicating that neutral radical radiative association is likely in the ISM and should be included in chemical models. These radicals are rare enough that the high rate coefficient still cannot account for all the production of dimethyl ether, but as chemical models continue to evolve to include new processes, and as the radicals themselves are found in new interstellar environments, radiative association should be considered. This example is particularly interesting because there is a bimolecular exit route (the production of formaldehyde and methane), which competes with the association route and dominates at high temperatures.