Kinetics study of the BrO + CH3O2 reaction under atmospehric conditions

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The role of halogen cycles in shaping the composition of marine boundary layer (MBL) air has been the subject of intense study in recent years. In an extensive global model study by Pyle and co-workers, the importance of bromine catalyzed ozone loss in the troposphere was emphasized, causing reductions of 4-6% in the northern hemisphere and up to 30% at high latitudes in the southern hemisphere. The BrO+CH_3O_2 reaction has a potential as a Br formation process in the BrO cycle as well as BrO + HO_2 reaction.

In this paper we have measured the rate constants for the reaction of BrO with CH_3O_2 at 233-333 K and 100-200 Torr total pressure of N_2 or O_2 diluents using cavity ring-down spectroscopy (CRDS). CRDS has been widely used in spectroscopic and kinetic studies for radical reactions, which are applicable to atmospheric modeling because CRDS is suitable for the experiments at wide ranges of pressure and temperature. Temperature dependence of the rate constants was investigated over the range 233-333 K and an Arrhenius type expression was obtained to be $4.6*10^{-13}$exp(798/T) cm^3 $molecule^{-1}$ s^{-1}. The product branching ratios were evaluated and the atmospheric implications are also discussed.