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Measurement of peroxy radicals by chemical ionization mass spectrometry with a corona ion source

Weihao Wang (1), Yee Jun Tham (1), Zhe Wang (1), David Tanner (2), Chuan Yu (1,3), and Tao Wang (1)

(1) Department of Civil and Environmental Engineering, Hong Kong Polytechnic University, Hong Kong, China, (2) School of Earth and Atmospheric Sciences, Georgia Institute of Technology, Atlanta, USA, (3) Environment Research Institute, Shandong University, Jinan, China

Peroxy radicals including hydroperoxyl (HO_2) and organic peroxy (RO_2) radicals play key roles in atmospheric radical chemistry. However, accurate measurement of these radicals remains a challenge due to low concentration, strong activity and not well known intereference. Here we present the measurement of ambient peroxy (HO_2+RO_2) radicals at an urban site in Hong Kong using chemical ionization mass spectrometry (CIMS) with a corona ion source. The peroxy radicals are titrated by NO into OH and further converted into H_2SO_4, which is detected by the CIMS through the reaction with NO_3^- ions. Although the corona ion source has advantages as a non-radiative source and with a low cost, it has a higher background and is less stable compared to the widely used radioactive source. We have improved the design of the corona ion source. The detection limit for the corona ion source is 1×10^8 molecules/cm^3 for an integration time of 1 min. Hexafluoropropylene (C_3F_6), which is widely used as OH scavenger, has been shown to produce HO_2 through its reaction with OH in presence of high concentrations of NO, leading to high instrument background for HO_2. The measurement results of ambient HO_2 and RO_2 during a photochemical episode will be presented.