

Multiphase Chemistry of Saturated Organic Nitrates in Polluted Urban Environments

Theodore K Koenig

Hong Kong University of Science and Technology, Hong Kong

Author list (excluding presenting author)

Yanli Ge, Xi Cheng, Gaoyuan Wei, Yan Zheng, Chong Zhang, Zhen Cheng, Sihua Lu, Limin Zeng, Chunxiang Ye, Jing Shang, Qi Chen

Abstract

Across several years of measurement of haze in Beijing saturated nitrogenated organics $C_nH_{2n+1}NO_{4,5,6}$ ($n = 5 - 10$) and monounsaturated nitrogenated organics $C_nH_{2n-1}NO_{4,5,6}$ ($n = 5 - 10$) were observed in both gaseous and particulate phases utilizing I-Chemical Ionization Mass Spectrometry (CIMS). Field data show clear daytime production of these species in the gas phase and Oxidation Flow Reactor (OFR) experiments confirm that the observed signals are consistent with hydroxy- and peroxy- alkyl nitrates produced by OH-initiated oxidation of select alkanes under high NO_x conditions. Utilizing Positive Matrix Factorization (PMF) for field observations indicates connections to aqueous chemistry and possibly ionic chemistry; it further suggests that particles could be a net source to the gas phase. Possible mechanisms such as nitric acid esterification and nitronium (NO_2^+) ion activity are investigated for reproduction of observed timeseries. Implications for NO_x as a form of source, reservoir, or recycling are discussed as is coupling and comparison to multiphase chlorine chemistry.

Early Career Scientist

YES, I am an early career scientist.

IGAC Regional Working Groups

China Working Group