

Interactive
Comment

Interactive comment on “Summertime PM_{2.5} ionic species in four major cities of China: nitrate formation in an ammonia-deficient atmosphere” by Ravi Kant Pathak et al.

P. Bhave

bhave.prakash@epa.gov

Received and published: 6 August 2008

The authors present ionic composition measurements of inorganic PM_{2.5} collected during the summer near 4 major cities in China. Their analysis focuses largely on the observations of abnormally high concentrations of particulate nitrate in the ammonium-poor samples collected near Beijing and Shanghai.

This is a very interesting finding and certainly worthy of publication and further investigation. As additional motivation for this analysis, the authors may be interested to know that numerical air quality models consistently underpredict the concentrations of particulate nitrate during Summer in the eastern United States because the observed levels

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper



of nitrate (though lower than the concentrations reported in this study) are consistently greater than those predicted by conventional thermodynamic gas/particle partitioning modules (e.g., ISORROPIA, EQUISOLV, etc.) embedded within the numerical models. The models predict essentially zero nitrate due to high sulfate and moderate ammonium concentrations found in the eastern U.S. during Summer.

The authors suggest that the high nitrate near Beijing and Shanghai was most probably formed via the heterogeneous hydrolysis of N_2O_5 . This raises a couple of questions.

1. Is there any reason to expect that nitrate formed via N_2O_5 hydrolysis should behave differently (from a thermodynamic standpoint) than nitric acid formed by gas-phase oxidation of NO_x ? In other words, why wouldn't the nitrate formed by N_2O_5 hydrolysis partition back to the gas phase and maintain thermodynamic equilibrium within the $\text{SO}_4/\text{NO}_3/\text{NH}_4/\text{H}_2\text{O}$ system?

2. Did the authors consider the possibility that a sizeable portion of the nitrate near Beijing and Shanghai may be present in the form of organic nitrates?

A final question that may be of minor importance to the overall findings: given that the authors measured the concentrations of sodium, calcium, magnesium, potassium, chloride, and nitrite ions, why aren't those values included when estimating $[\text{H}^+]_{\text{total}}$ on Line 10 of page 11495?

If the authors can address these questions (especially the first 2) in their final paper, it may provide more valuable insights for future air quality model development.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 11487, 2008.

[Full Screen / Esc](#)[Printer-friendly Version](#)[Interactive Discussion](#)[Discussion Paper](#)