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Interactive comment on “The effects of nitrate on the heterogeneous uptake of sulfur dioxide on hematite” by L. D. Kong et al.

Anonymous Referee #3

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The authors utilized online spectroscopic and offline chromatographic approach to investigate the effects of nitrate on the heterogeneous uptake of SO₂ on hematite. There are several issues in this work. Firstly, the substrates have been known to play important roles in heterogeneous uptake. The author should have performed more characterization about their hematite samples. Secondly, the authors intended to understand how nitrate affects heterogeneous SO₂ uptake, but there is no uptake coefficient data reported in this work. The IR spectra actually have shown spectral evolution of different absorption peaks. I do not understand why the authors avoided using their infrared data to derive reaction kinetics. Note that they did use sulfate formation rate as a semi-quantitative approach for the uptake measurements. This is very problematic because it is not always true that reactant (SO₂) is completely converted to products (sulfate).

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Secondary processes could occur on the hematite surface and more importantly various hematite surfaces could lead to drastically different product formation. Again, more information about their hematite sample is critically needed. Moreover, for a typical uptake study, experiments are conducted under a pseudo-first-order condition. It is unclear to me that how their experiment conditions meet such a requirement.

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 11577, 2014.

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