

***Interactive comment on* “Sulfur isotope fractionation during oxidation of sulfur dioxide: gas-phase oxidation by OH radicals and aqueous oxidation by H<sub>2</sub>O<sub>2</sub>, O<sub>3</sub> and iron catalysis” by E. Harris et al.**

**Anonymous Referee #3**

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The paper refers to the interesting subject concernig the kinetic isotope effects of SO<sub>2</sub> oxidation. However it is rather difficult to use the data in the study of environmental phenomena. There are many factors influencing anthropogenic sulfur isotope composition, like isotope composition of sulfur in coal which later on is used as a fuel and result in SO<sub>2</sub> emission in flue gases (A.G.Chmielewski et al, Sulfur isotope composition of selected Polish coals, Nukleonika, 4(Supplement 1) S67 - S68 (2002). Moreover widely introduced FGD systems change sulfur isotope composition further ( M.Derda et al, Isotopes in Environmental and Health Studies, 43(1), 57-53 (2007). The Authors

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should consider and comment these facts. Since they state in the conclusions: "This will allow stable sulfur isotopes to be used to understand the partitioning between these pathways in atmospheric samples". I do not understand well why  $r$  is taken as a path of diffusion ( $D$  is the diffusion coefficient and  $r$  is the radius of the reactor, since the sulfuric acid molecules(or aggregates, if the water vapor is present?), can be present in the gas stream closer to the wall. I agree with many points mentioned by Anonymous Referee # 2, whose review is so well elaborated.

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Interactive comment on Atmos. Chem. Phys. Discuss., 11, 23959, 2011.

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