Comments from referee #1 are in blue, and our replies are in black. Changes to the manuscripts are highlighted in red.

This manuscript presents a timely and thorough review and evaluation of experimentally determined gas phase diffusion coefficients for reactive inorganic atmospheric trace gases. Accurate diffusion coefficients are required to evaluate the uptake rate of reactive and/or soluble trace gases by cloud/fog droplets, accumulation mode or larger aerosol particles and macroscopic surfaces such as buildings, soil, sea or fresh water and vegetation.

This review accomplishes several useful functions, including: 1) reviewing the most appropriate experimental and computational methods available to measure/estimate gas phase diffusion coefficients; 2) cataloging available experimental data for measurements made at atmospherically relevant temperatures and for relevant bath and trace gases; 3) computing estimated diffusion coefficients for the available measured systems using Fuller's method, the most widely accepted semi-empirical model; 4) evaluating the resulting experimental and computational results to identify and estimate the uncertainty associated with the best available data for use in analyzing experimental heterogeneous kinetics experiments and modeling heterogeneous atmospheric chemistry; and 5) identifying important data gaps to stimulate and guide future measurements.

The manuscript is well referenced, well-illustrated and generally well written. I recommend acceptance for publication in ACP.

Reply: We would like to thank referee #1 for his/her highly positive comments. Though no revision was required by referee #1, we have made the following changes in the revised version:

[1] We have changed the title of the manuscript to "Compilation and evaluation of gas-phase diffusion coefficients of reactive trace gases in the atmosphere: Volume 1. Inorganic compounds", because we have started to compile and evaluate the diffusion coefficients of organics, and we plan to submit another manuscript with the title "Compilation and evaluation of gas-phase diffusion coefficients of reactive trace gases in the atmosphere: Volume 2. Organics" this year.

[2] We found another two papers which reported the diffusion coefficients of NO_2 and Br_2, respectively, and the corresponding contents in the manuscript have been updated.

[3] A different version of this compilation/evaluation has been updated online, enabling new experimental data to be compiled, evaluated, and disseminated. We have mentioned this update in a few places of the revised manuscript.

[4] The role of heterogeneous reactions and gas phase diffusion in indoor air quality (Nazaroff and Cass, 1989) has been mentioned in the revised manuscript.

I did notice some typographical and usage errors and suggest the following copy edits:

1) page 15653, line 14 – remove "as" after "called"

2) page 15654, line 23 – replace "which we include" with "that we include" or put a comma between "gases" and "which"

3) page 15655, line 1 – change “are the molar fraction” to “are the molar fractions”

4) page 15655, line 2 – change “is the diffusivity” with “are the diffusivities”

5) page 15656, equation (13) – second term on rhs numerator should be c_i-c_{i-1} not c_i-c_{i-1}

6) page 15658, lines 22, 23 & 24 and page 15667 line 31 – the text on 15658 twice says “De andreade” but the reference on page 15667 says “De Andrede”

7) page 15662, line 27 – consider rephrasing “a factor of 1-2 larger” since a factor of 1 is not larger

8) page 15679, line 3 of Table 5 footnote –remove extraneous “;” after superscript “h”

9) page 15681, last line of Figure 1 caption – change “pressure” to “pressures”

Reply: We would like to thank referee #1 for carefully reading our manuscript. The typos pointed by him/her have been corrected.

Comments from referee #2 are in blue, and our replies are in black. Changes to the manuscripts are highlighted in red (in both this reply and the revised manuscript).

Heterogeneous reactions between atmospheric aerosols and trace gaseous species play crucial roles in atmospheric chemistry. Diffusion coefficients are required to accurately determine reactive uptake coefficients when aerosol particles are large and trace gaseous species are reactive towards the aerosol surfaces. This manuscript compiled and evaluated the diffusion coefficients of atmospheric reactive trace species (largely inorganic ones) and compared the experimentally data to those estimated values based on Fuller's method as well. The manuscript is well organized, referenced, and written. It offers much needed dataset for atmospheric chemistry community.

Reply: We would like to thank referee #1 for his/her highly positive comments. Though no revision was required by referee #1, we have made the following changes in the revised version:

[1] We have changed the title of the manuscript to "Compilation and evaluation of gas-phase diffusion coefficients of reactive trace gases in the atmosphere: Volume 1. Inorganic compounds", because we have started to compile and evaluate the diffusion coefficients of organics, and we plan to submit another manuscript with the title "Compilation and evaluation of gas-phase diffusion coefficients of reactive trace gases in the atmosphere: Volume 2. Organics" this year.

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