The following contains the comments of the referee (black), our replies (blue) indicating changes that will be made to the revised document (red).

Reviewer #1

This is an excellent and very careful study of the kinetics of the reaction of OH radical with NO2, a reaction of central atmospheric significance. The main finding associated with this work (the second paper from this group on this reaction) is the finding of a significant enhancement to the OH/NO2 rate coefficient in the presence of water vapor. This enhancement is quantified in both N2 and He bath gas, and as a function of temperature. The data appear to be of the highest quality, previous data are discussed in detail, and the modeling work adds significantly to the atmospheric context, and hence the overall value of the manuscript. Overall a superb study! I recommend publication in ACP, after consideration of the minor comments listed below.
We thank the reviewer for the careful review and the positive assessment of our manuscript.

L12 – molecule misspelled. Corrected

L64 – exponent should be +3. Corrected

L127 – evaluation of atmospheric. Corrected

L148- Maybe it is obvious, but it could be added to the text that fitting with an increased Fc gives a lower ko, (which doesn't fit the data).
We have added:
We note that using a higher F_c=0.39 resulted in a lower value of k_0^{He} equal to 1.0 × 10^{-30} cm^6 $\mathrm{molecule}^{-2}$ s^{-1}.

Page 4,5 - The pure He data are taken here at 292 K, somewhat below other 'room temperature' datasets that comparisons are being made with. Has this has been taken into account? If not, could this account for at least some of the systematic discrepancies with D'Ottoni or Morley?
In Figure 1, we did not attempt to apply any corrections to previous works to account for temperature differences. In the more rigorous comparison of our work with others (Fig S3-S5), we used our parametrization at the given temperatures of the previous studies.
We now write in the Figure S3, S4 and S5 captions the temperature for which *k(T,p)* was calculated.

On a related point, there is a T-dependence to the He ko that appears in various places (captions to Fig 2, Fig 4b, L252). What is the origin of this value? (I think it is mostly unnecessary).
The T-dependence in He was determined in our laboratory over a small range of temperatures (277, 292 and 332 K) and pressures. We have added the data points used to determine *m*(He) in Table 1, a Figure (S10) in the supplementary information and the text below:

The T-dependence factor in He, *m*(He), was determined to be 3.1 over the temperature range from 277 to 332 K (Table 1 and Figure S6).

T (K)	*p* (Torr)	M^a	OH precursor	k_1^{b}
277	48.6	1.68	H_2O_2	1.59 ± 0.14
292	25.1	0.83	H_2O_2 ^{c}	0.75 ± 0.07
	50.0	1.65	H_2O_2	1.37 ± 0.08
	75.1	2.47	H_2O_2	1.88 ± 0.12
	102.9	3.39	HNO_3	2.32 ± 0.15
	206.9	6.81	HNO_3 ^{d}	3.73 ± 0.25
	300.7	9.89	HNO_3	4.64 ± 0.29
	405.8	13.35	HNO_3	5.54 ± 0.37
	495.6	16.30	HNO_3	6.29 ± 0.40
	595.0	19.57	HNO_3	6.83 ± 0.42
	689.1	22.67	HNO_3	7.46 ± 0.46
332	28.1	0.82	H_2O_2	0.60 ± 0.06
	56.8	1.65	H_2O_2	0.99 ± 0.08
	85.4	2.48	H_2O_2	1.34 ± 0.10

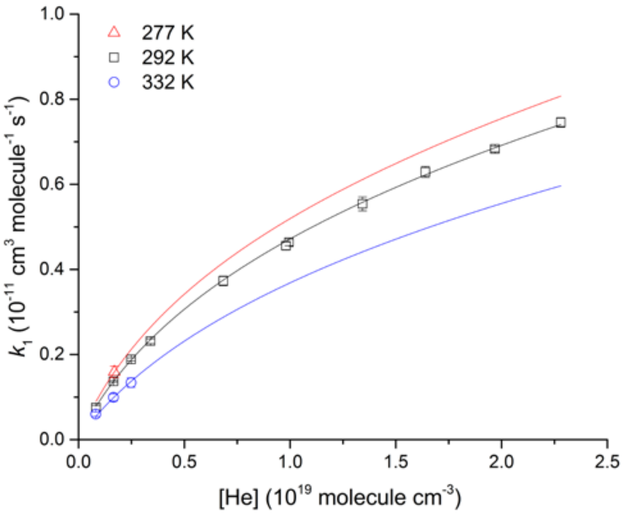

Figure S6. Values of k_1 as a function of He concentration at 277, 292 and 332 K. Errors are 2σ statistical only. The solid line is a fit to our data using Eqn. (4) with $k_0 = 1.4 \times 10^{-30}$ cm^6 molecule^{-2} s^{-1}, $k_\infty = 6.3 \times 10^{-11}$ cm^3 molecule^{-1} s^{-1}, $F_c = 0.32$, $m = 3.1$ and $n = 0$.

L209- delete molecules Corrected

L252 – temperature dependence Corrected

L254 – delete use Corrected

L275 and forward – The tests for HONO and HNO3 are really nice !

L297 – temperature instead of temperatures Corrected

L342 – H2O, not HO2, as product of (R7) Corrected

L406 – short at Corrected

L408 – temperature and pressure conditions Corrected