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

Reviewer #2

The manuscript describes the determination of the rate constant of the OH + NO2 reaction with He and N2 as bath gases in presence and absence of gaseous H2O. A quasi-static reaction cell was used, and OH was produced by pulsed laser photolysis of HNO3, H2O2, or O3/H2O mixtures. Pseudo-first order conditions with respect to [OH] were applied. The OH concentration was monitored time-resolved by laser-induced fluorescence, and the (crucial) NO2 concentration was carefully determined with two different absorption-spectroscopic approaches. A notable increase of the OH + NO2 rate constant in He and N2 when H2O is present was observed and associated with a particularly high efficiency of H2O for collisional stabilization of the HNO3 product. Non-linear mixing rules for the collisional efficiencies seem to apply. Very careful parameterizations and statistical evaluations of the experimental results, including earlier literature data, were performed and discussed in great detail, also with respect to branching between HONO2 and HOONO as reaction products. The newly parameterized rate constant is incorporated in a 3D chemical transport model, and effects on quantities such as the atmospheric HNO3/NO2 ratio, the atmospheric concentration of OH, or the HOONO/HO2NO2 ratio are assessed. All in all, this is a very nice paper bridging high-level state-of-the-art laboratory measurements with global atmospheric modeling. So the topic is at the very heart of ACP, and I recommend publication essentially ′as is′ with only very few, very minor points to be considered by the authors:
We thank the reviewer for the careful review and the positive assessment of our manuscript.

line 35:′gases′ should probably read ′gas′ Corrected

line 68:′O3-H2O′ should probably better read ′O3/H2O′ Corrected

Tables 1 and 2: please specify/explain M
In Table 1, we modified the caption below with:
Molecular density M(He) in units of 10^{18} molecule cm^{-3}
In Table 2, we modified in the caption,
Molecular density M(He-H_2O) or M(N_2-H_2O) in units of 10^{18} molecule cm^{-3}

Fig. 1, figure caption: please give the parameters m and n
The figure 1 caption now reads:
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.

Fig. 2, figure caption: please give the parameter n
The figure 2 caption now reads:
The black line is our parameterisation 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}, $m = 3.1$, n=0 and $F_c = 0.32$.