# Supporting Information

# Removal of ammonia by OH radical in aqueous phase

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Figure S1 Experiment apparatus of photooxidation of ammonia in the presence of $H_2O_2$

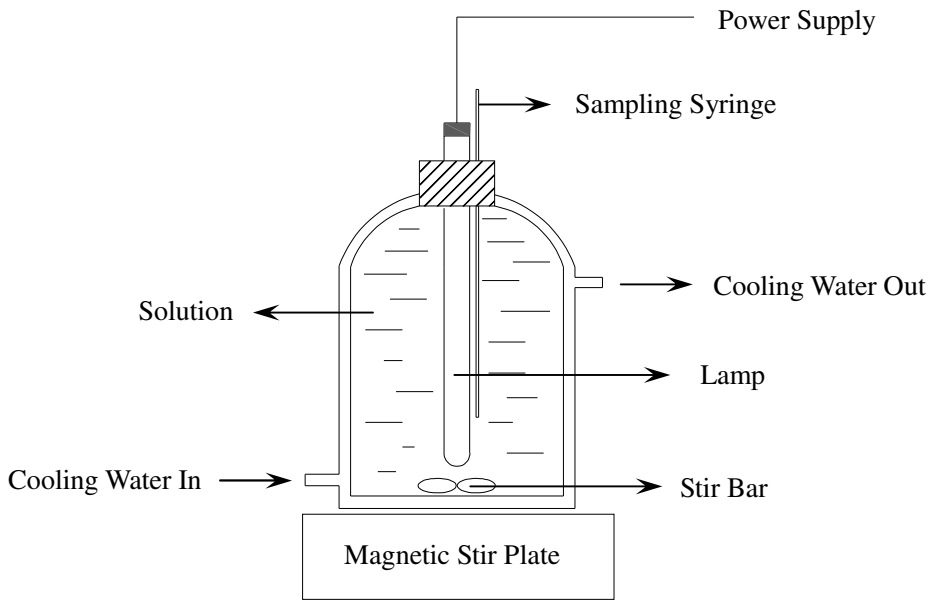

Figure S2 Time profile of ammonia concentration without UV irradiation

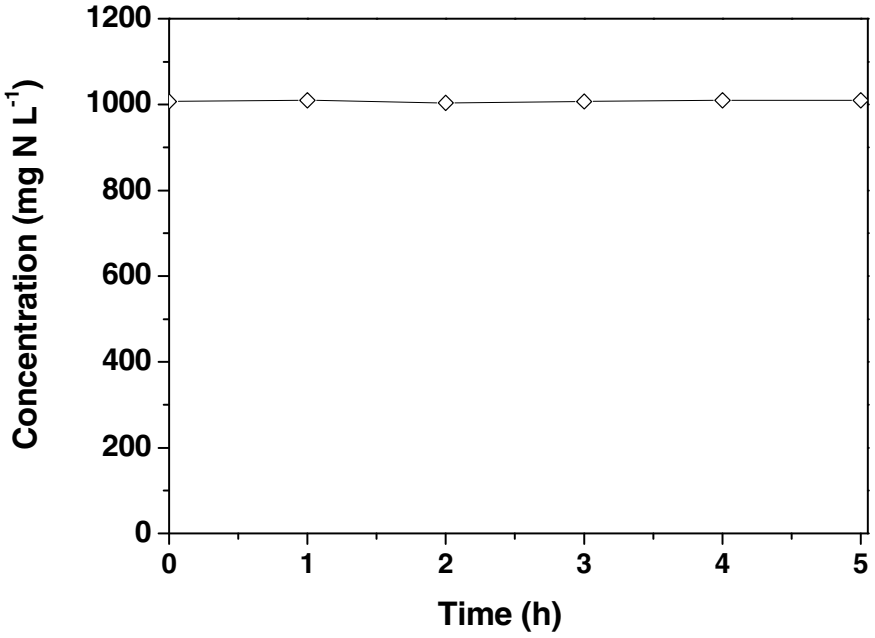

Table S1 Analysis methods for ammonia, $NO_2^-$, and $NO_3^-$.

| | Analysis Method | Detection limit (mg/L) |
|---|---|---|
| ammonia | Ammonia-Nessler's reagent colorimetric method: Ammonia is analyzed by its reaction with Nessler's reagent ($KI + HgI_2$) in basic condition and is measured spectrophotometrically at 410 nm. | 0.02 |
| $NO_3^-$ | Cadmium reduction method: $NO_3^-$ is reduced quantitatively to nitrite in the presence of cadmium (Cd). The nitrite produced is determined by diazotizing with sulfanilamide and coupling with N-(1-naphthyl)-ethylenediamine to form a reddish purple azo dye that is measured colorimetrically. A correction should be made for any nitrite present in the sample by analyzing without the reduction step. | 0.01 |
| $NO_2^-$ | Colorimetric method: $NO_2^-$ is determined by diazotizing with sulfanilamide and coupling with N-(1-naphthyl)-ethylenediamine to form a reddish purple azo dye at pH 2.0 to 2.5 which is measured spectrophotometrically at 543 nm. | 0.002 |

Table S2 Ammonia oxidation process at initial $H_2O_2$ concentration of 0.02 M

| Time (h) | ammonia concentration (mg-N/L) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | pH = 2.0 | | | pH = 7.0 | | | pH = 9.3 | | |
| | Run 1 | Run 2 | Run 3 | Run 4 | Run 5 | Run 6 | Run 7 | Run 8 | Run 9 |
| 0 | 1012 | 102 | 31 | 1003 | 103 | 31 | 1006 | 99 | 31 |
| 1 | 1012 | 102 | 31 | 997 | 102 | 30 | 991 | 95 | 29 |
| 2 | 1012 | 102 | 31 | 994 | 102 | 30 | 971 | 88 | 27 |
| 3 | 1012 | 102 | 31 | 991 | 102 | 30 | 960 | 84 | 25 |
| 4 | 1009 | 102 | 31 | 991 | 101 | 30 | 948 | 80 | 23 |
| 5 | 1009 | 102 | 31 | 991 | 101 | 30 | 928 | 79 | 22 |