Supporting Information

Investigation of Matrix Effects in Laboratory Studies of Catalytic Ozonation Processes

Submitted by

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Text S1 and Text S2

Figure S1 to S6

Text S1: Metal loading test

The metal (Cu, Fe, Mn) loading on the prepared catalysts was measured by soaking 1 g of catalysts in 10 ml 65% nitric acid for 24 h at ambient temperature to dissolve the metal oxide from the support. The solid was filtered out and the metal concentrations in the solution was measured using Hach method 8506 (Cu, 0.04 – 5.00 mg/L), 8008 (Fe, 0.02 – 3.00 mg/L), and 8034 (Mn, 0.1 – 20 mg/L), after necessary dilutions

Text S2: Ozone decomposition experiments

1L ozone saturated solution was prepared in a 1L Erlenmeyer flask by continuously feeding ozone gas into the container. The saturated ozone solution was then quickly transferred into five 100 mL Erlenmeyer flasks (previously rinsed with ozone saturated water) to obtain 50 mL ozone solution in each flask which was sealed with a ground glass stopper and stirred magnetically. The dissolved ozone concentration (DO_3) in each flask was measured after a specific time interval (e.g. flask 1: 5 min, flask 2: 10 min etc.). In order to check if the ozone desorption into the headspace was significant or not, we tested DO_3 evolution of ozone solution in the 100 mL flasks prepared as described above, as well as DO_3 evolution in the 1 L flask, i.e., without any solution transfer. As shown in the Figure S1, the DO_3 profiles under these two conditions are similar, indicating the effect of ozone desorption was not pronounced here.

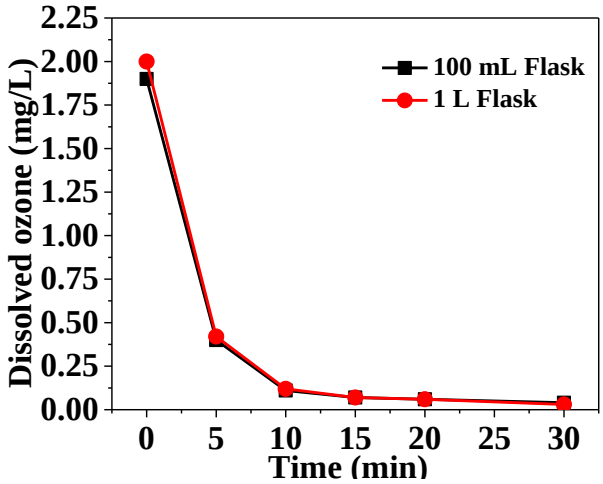

Figure S1. Comparison of the dissolved ozone concentration in different flask. [Initial pH = 7.00 ± 0.20]

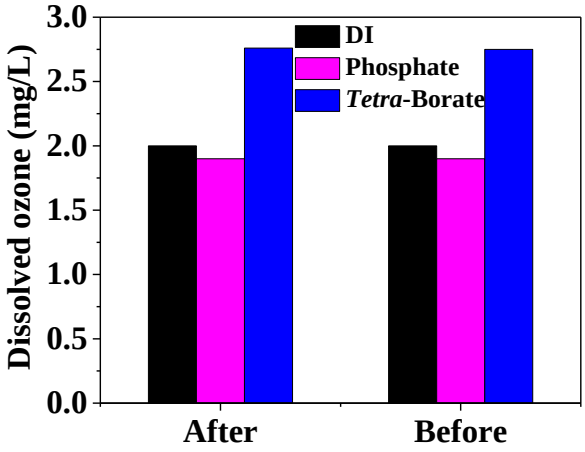

Figure S2. Comparison of the dissolved ozone concentration before and after filtration. [Initial pH = 7.00 ± 0.20].

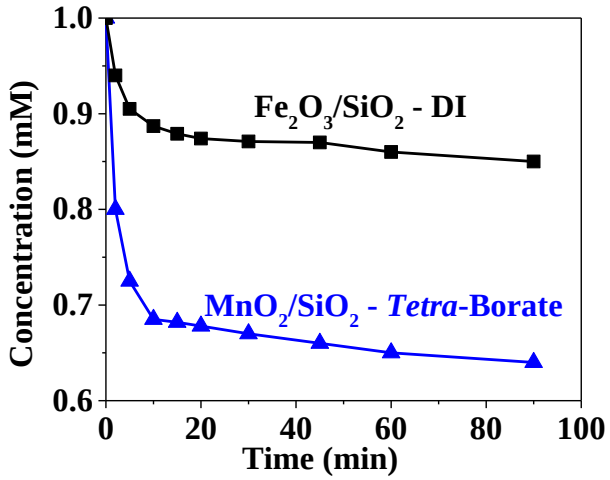

Figure S3. Oxalate degradation during longer experiment runs of Fe_2O_3/SiO_2 in DI water and MnO_2/SiO_2 in *tetra*-borate buffered solution. [Initial concentration: Oxalate, 1 mM, working solution: 200 mL, heterogeneous catalyst dose: 0.50 g, initial pH = 7.00 ± 0.20].

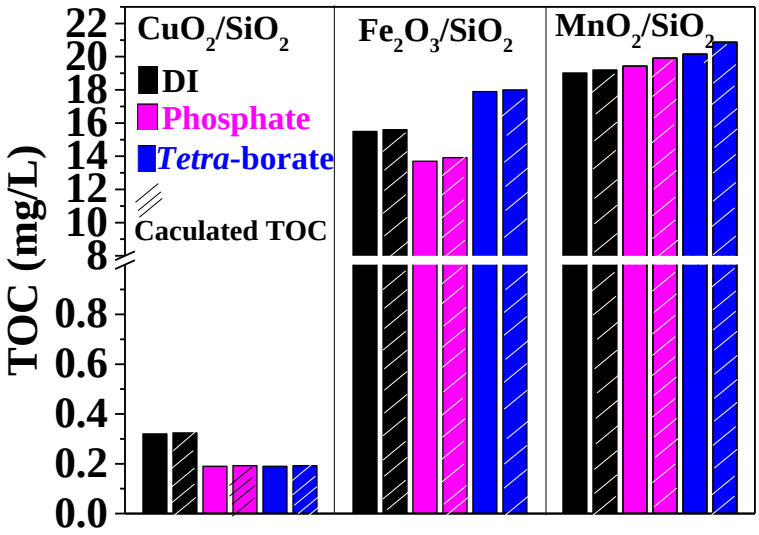

Figure S4. Measured TOC vs calculated TOC of OA after 30 min treatment. [Initial OA: 1.0 mM; working solution: 200 mL; catalyst does: 500 mg; pH = 7.00 ± 0.20]

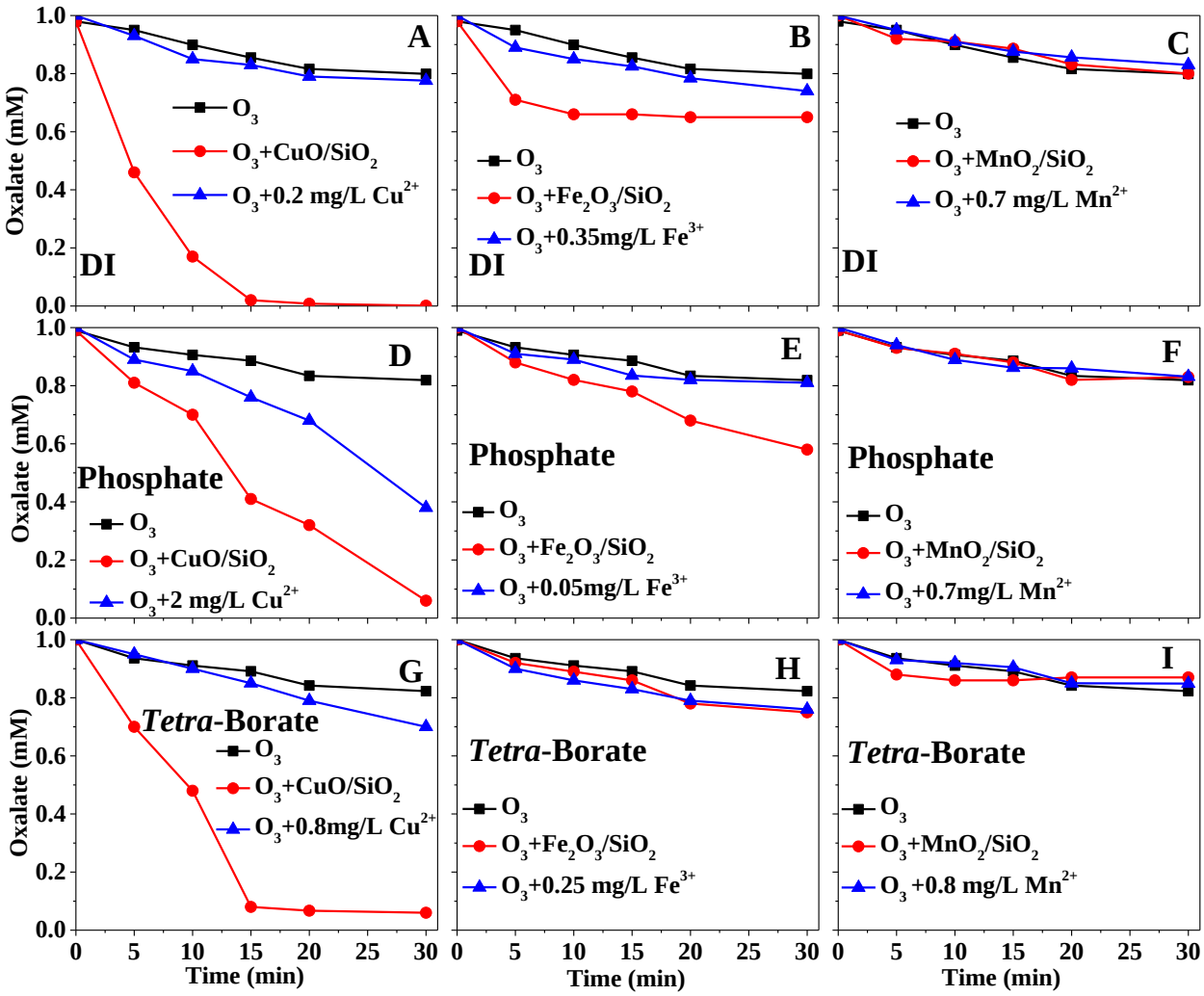

Figure S5. Comparison of heterogeneous and homogeneous catalytic ozonation. [Initial concentration: oxalate: 1 mM, working solution: 200 mL, initial pH = 7.00 ± 0.20, metal ion concentration: leached metal measured at 15 min].

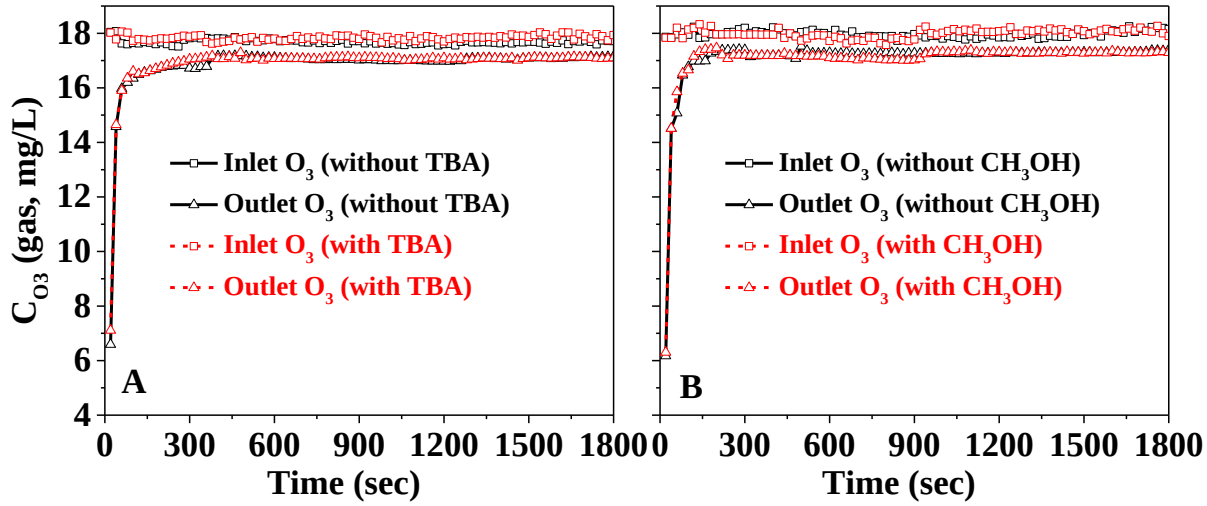

Figure S6. Comparison of the gas ozone in the feeding line and off gas line during the runs with and without TBA/CH_3OH (methanol) [Initial pH = 7.00 ± 0.20].