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Supplement of

Evaluation of cation exchange membrane performance under exposure to high Hg^0 and HgBr_2 concentrations

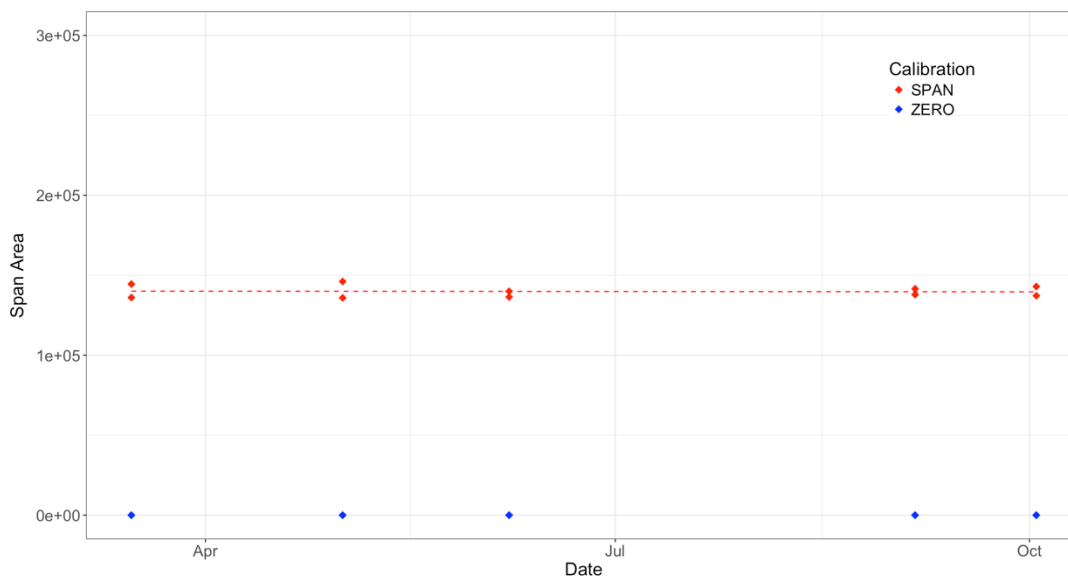
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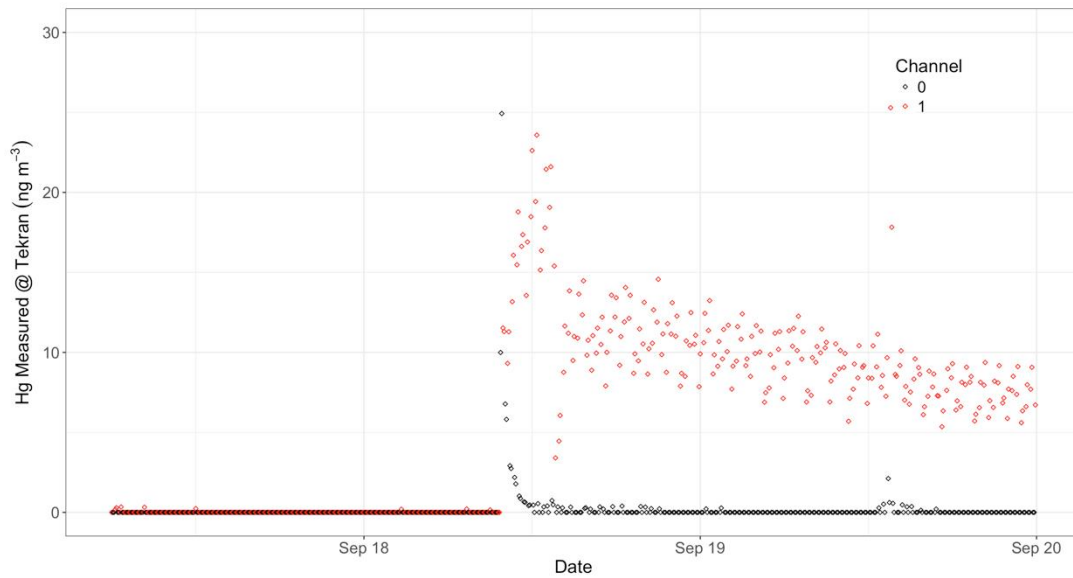
Tekran® QA/QC

The Tekran® 2537A unit operated consistently over the duration of study. All internal calibrations showed good analyzer zeros, and stable span areas ($139875 \pm 2.7\%$) with no drift (SI Fig. 1). The calibration data indicates that: 1) there was no Hg contamination within the 2537A unit, and 2) there was no passivation of the gold traps. Every calibration was also checked by external Hg vapor source injections (mean recovery $101.1\% \pm 4.3$, $n = 10$). The system was not operated with a recurring automatic internal calibration, due to the variable timing of the experimental work.

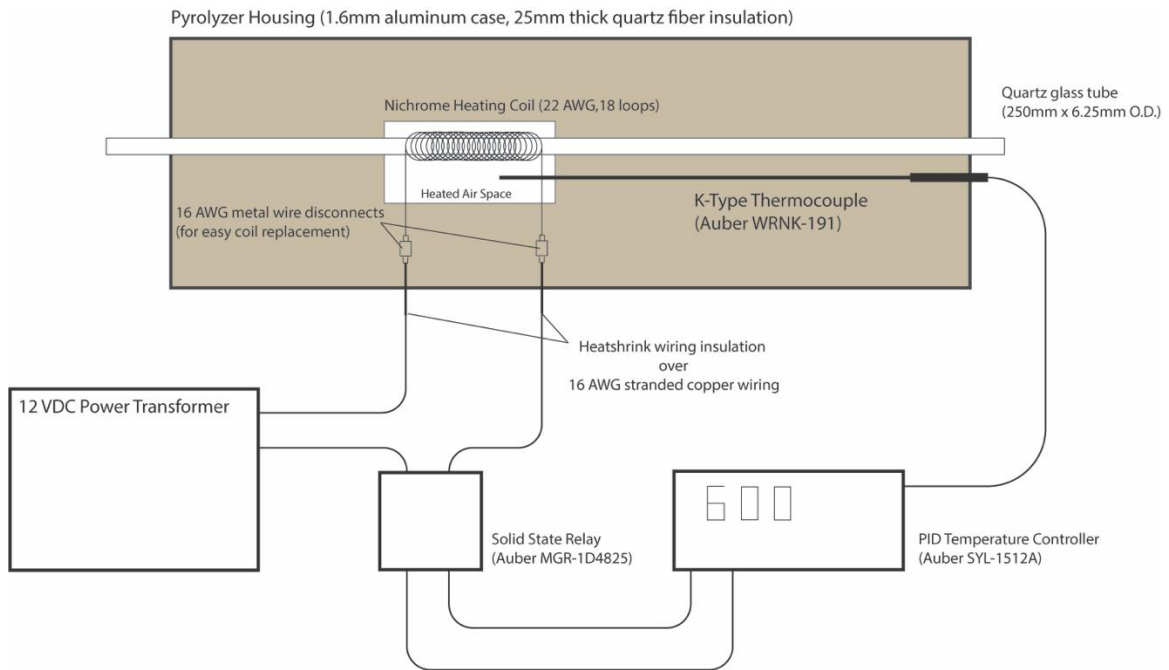


SI Figure 1. Tekran® 2537A internal calibration data for the duration of the study.

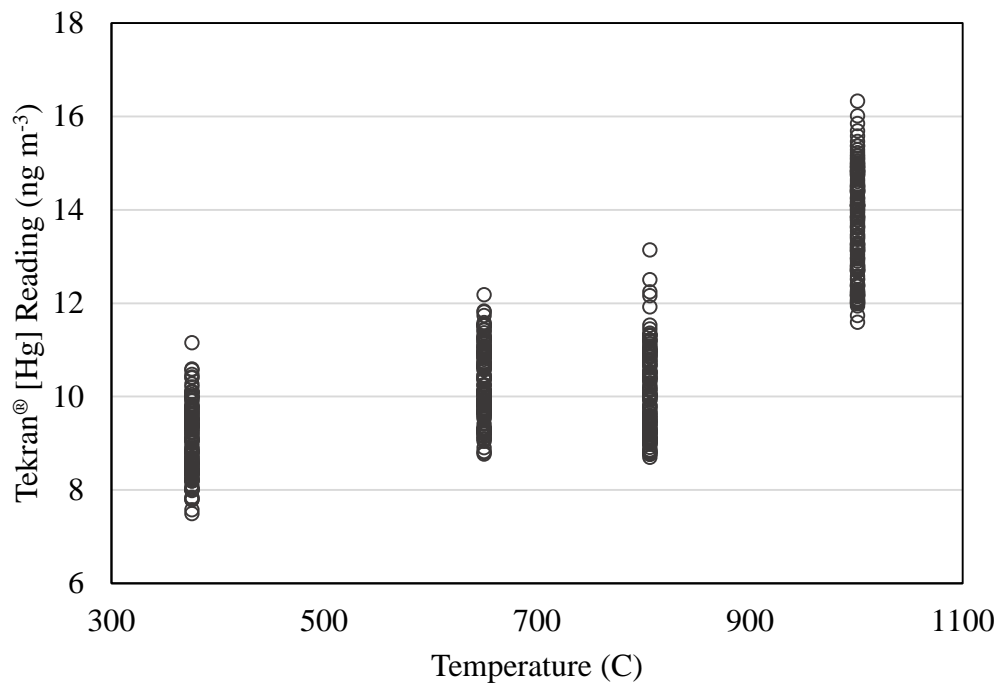
System blanks were performed by flowing scrubbed zero air through the entire path of the permeation system that produced blank values below the Tekran® 2537A detection limit ($< 0.1 \text{ ng m}^{-3}$, SI Fig. 2 as example). In addition, the system routinely zeroed when deploying CEM filters on both sample lines during HgBr_2 permeations.



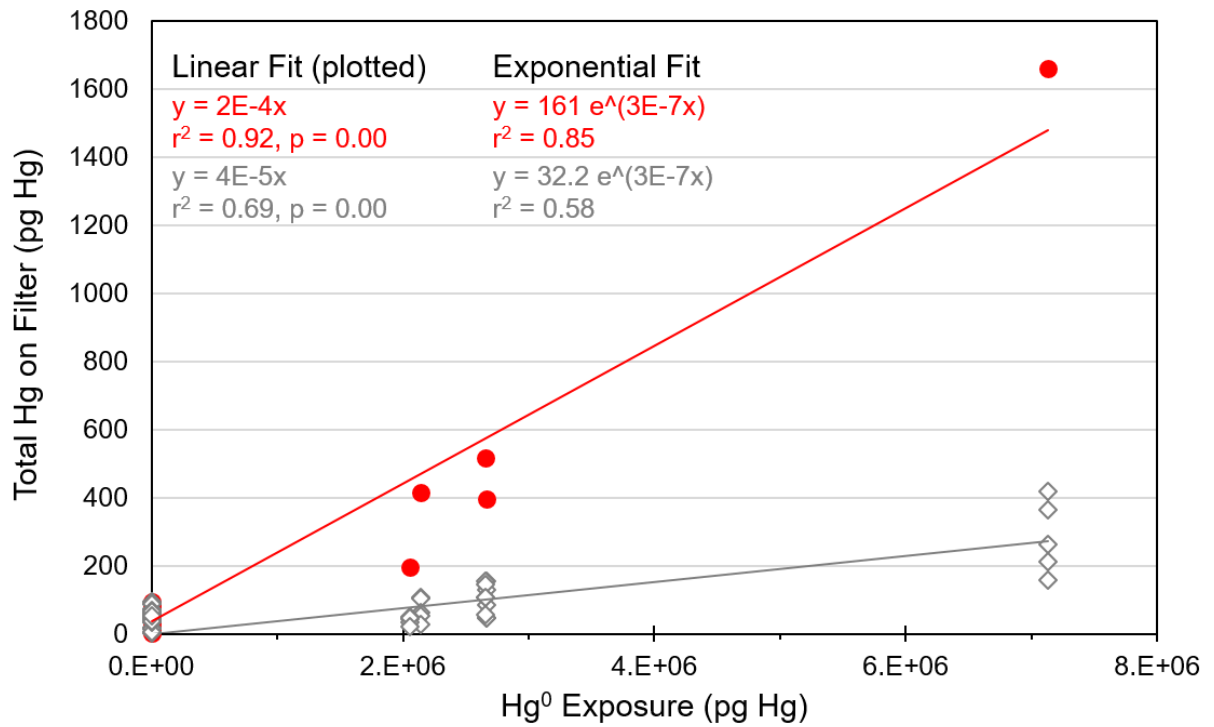
SI Figure 2. Example of system zero check prior to turning on HgBr_2 permeation source.



SI Figure 3. Detailed schematic of pyrolyzer design.



SI Figure 4. Mercury measurements at the downstream Tekran® 2537A at different pyrolyzer temperatures.



SI Figure 5. Hg on first in-line CEM filters (red circles) versus following downstream filters (open diamonds and regression line) during the 5 GEM permeations. The first filters were not used in calculations of GEM uptake, on the strong suspicion they were capturing a small component of residual RM. Both linear and exponential model fits and r^2 values are provided for both sets of filters to demonstrate linearity of Hg loading onto the membranes.