

Supplementary Information

Evaluation of the Generation of Acid Contaminants in Small-Scale Ozonators

Roger F. Baldissera,  ^{*}^a **Francielle Annunziato,** ^a **Vicente Canalli**^a and **Marçal J. R. Pires**  ^{*}^a

^aLaboratório de Química Analítica Ambiental (LQAmb), Programa de Pós-Graduação em Engenharia e Tecnologia de Materiais (PGETEMA), Pontifícia Universidade Católica do Rio Grande do Sul (PUCRS), 90619-900 Porto Alegre-RS, Brazil

*e-mail: mpires@pucrs.br

Experimental

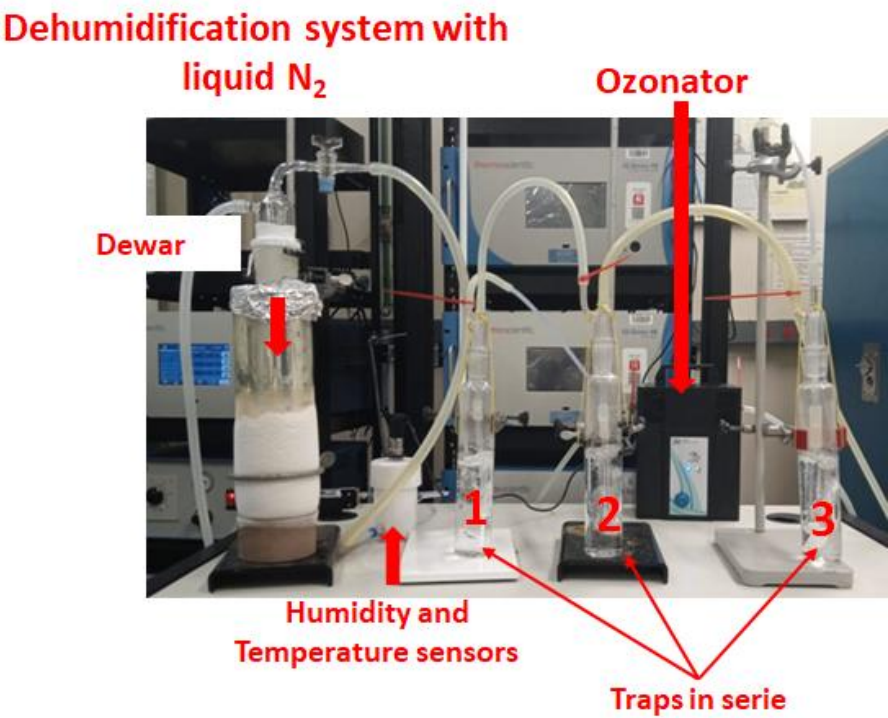


Figure S1. Image of the contaminant collection system and the liquid nitrogen trap for removing moisture from the feed gas (L min⁻¹).

Results

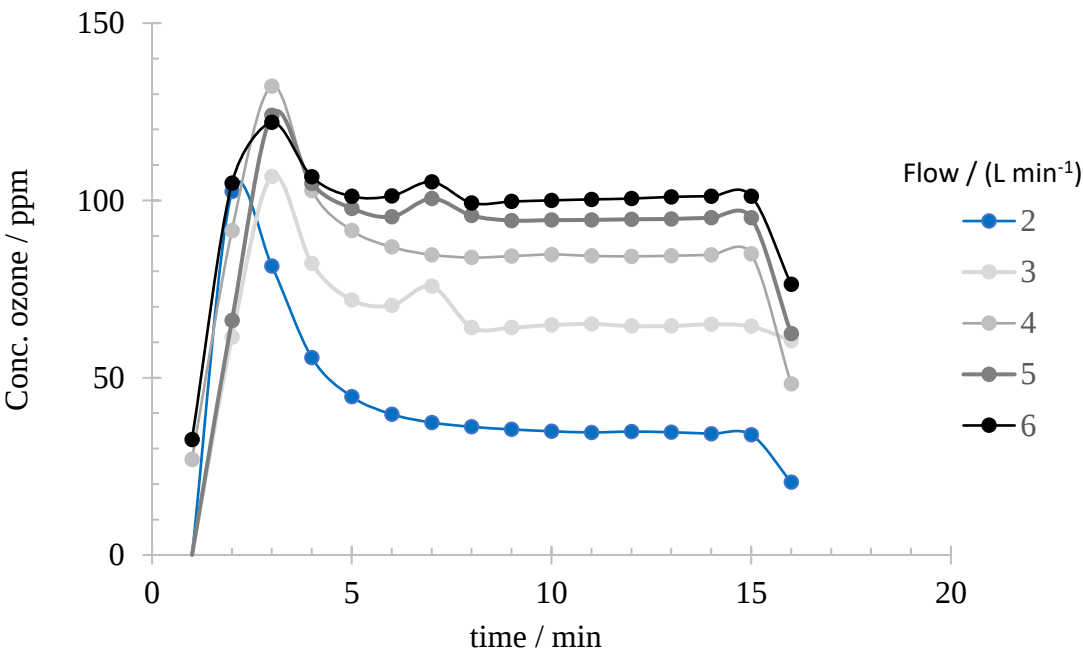


Figure S2. Ozone concentration profile generated by the OZ01 ozonator at different clean air flows (RH 25 ± 5%).

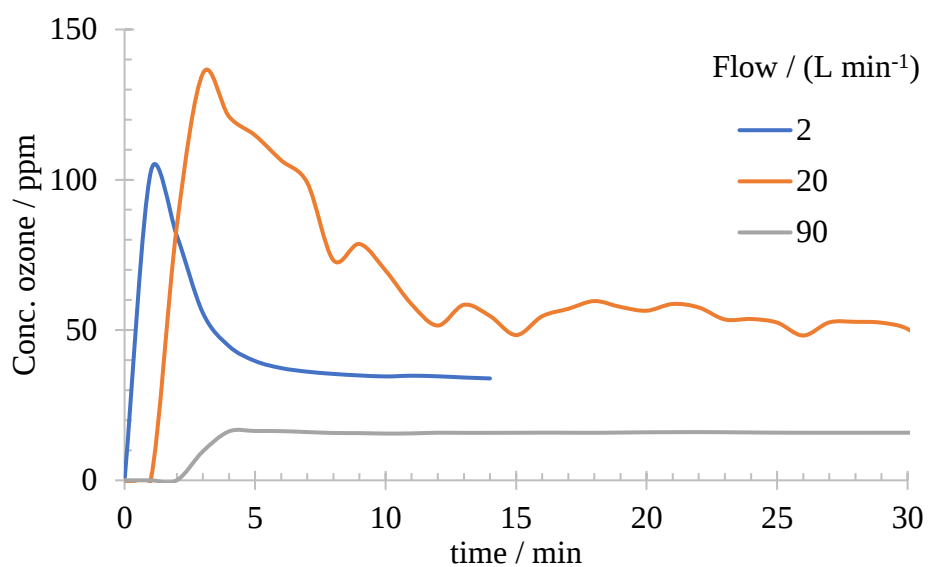


Figure S3. Ozone concentration profiles for different feed gas flows (2, 20 and 90 L min⁻¹).

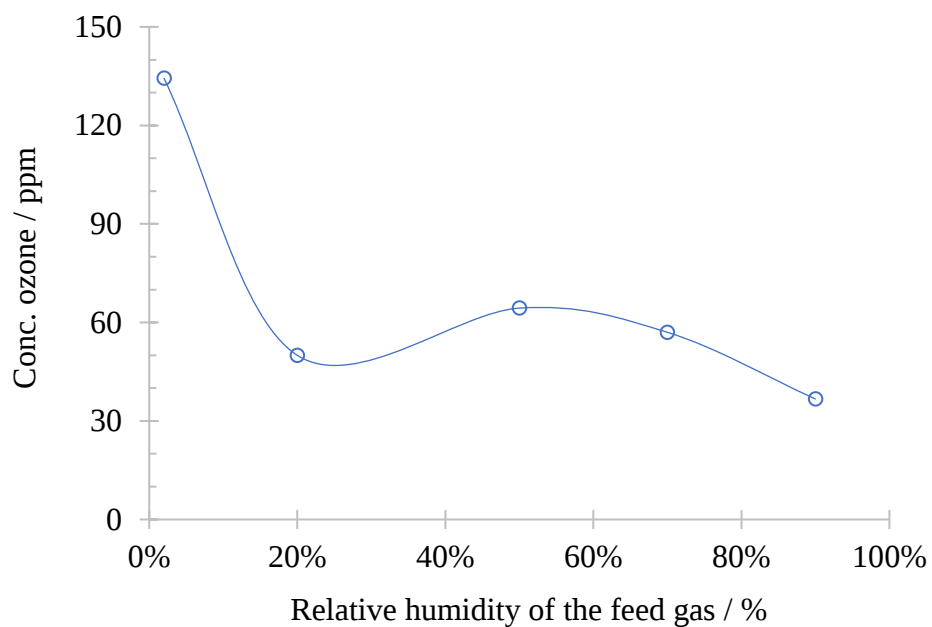


Figure S4. Ozone concentration produced at different relative humidities of the feed gas (2 L min⁻¹ of clean air).

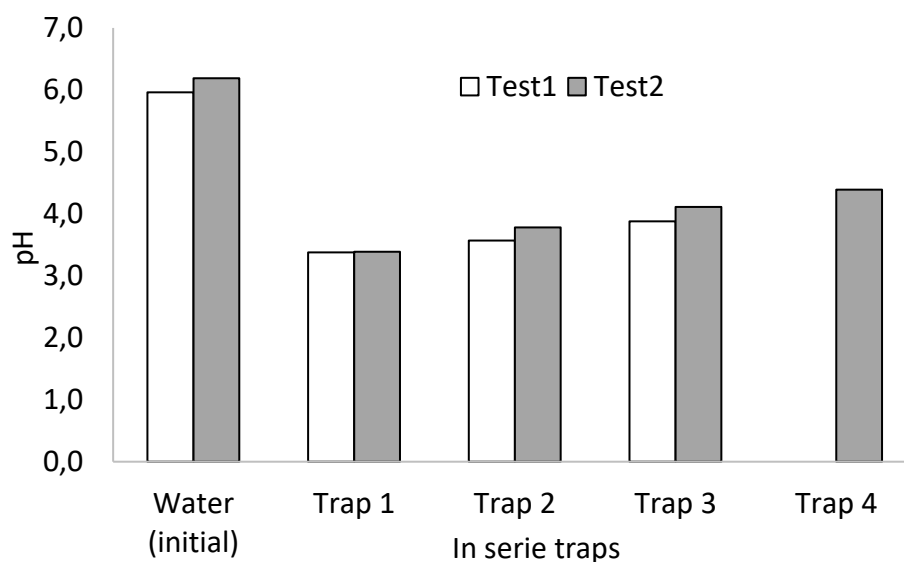


Figure S5. pH of ultrapure water (initial) and retention solutions at the end of tests with 3 and 4 traps in series, using the OZ01 ozonator with clean air (2 L min^{-1} , RH 25%).

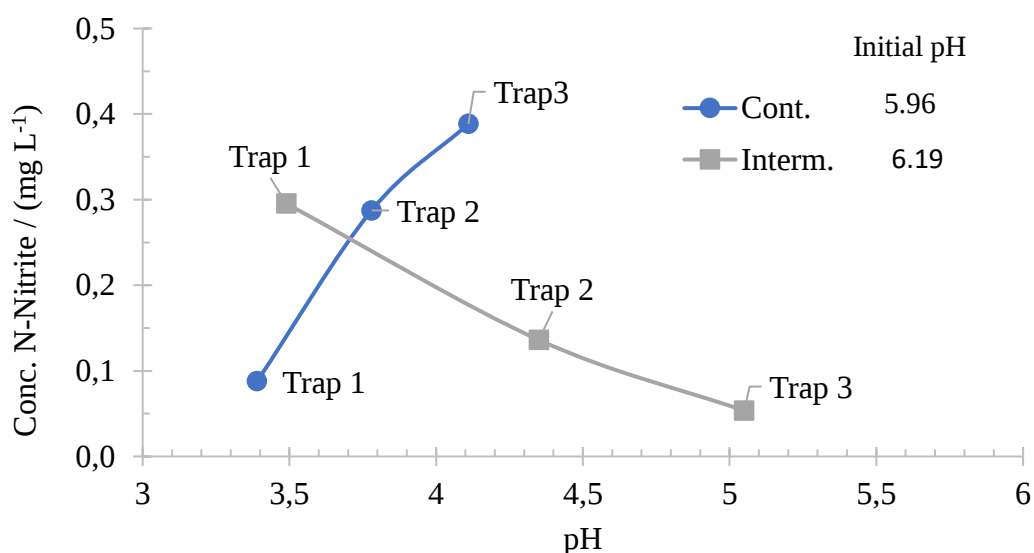


Figure S6. Mass of nitrite retained in each trap in tests with ozonators operating in continuous and intermittent mode (short cycle), using clean air (2 L min^{-1} , RH 25%).

Contribution of the presence of NO_x in ambient air on contaminant generation on Ozonator OZ3

The ambient air used as feed gas on Ozonator OZ03 was not purified and air pollutants could be present, among the nitrogen oxides (NO_2 and NO). The presence of the NO_x in ambient air used in the tests was not measured because the NO_x analyzer was not available, but an estimate of the contribution of NO_x present in the ambient air in metropolitan area of Porto Alegre in 2023 was made by FEPAM.¹

Using 90 L min^{-1} of ambient air and considering an annual hourly average of 10.1 ug m^{-3} of NO_2 present in the air, the calculated value of NO_2 coming from the ambient air is only 2.3% of the measured value of NO_2 production from OZ03.

Reference

1. Fundação Estadual de Proteção Ambiental Henrique Luiz Roessler (FEPAM), *Relatório Técnico, Monitoramento da Qualidade do Ar Rede Automática - Ar do Sul ano de 2023*, Porto Alegre, 2024. [[Link](#)] accessed in January 2025

