

Reviewer's comments

Comments on “Heterogeneous Phototransformation of Halogenated Polycyclic Aromatic Hydrocarbons: Influencing Factors, Mechanisms and Products” egosphere-2024-2814

This study provides a comprehensive investigation into the emerging persistent organic pollutants, Chlorinated and brominated polycyclic aromatic hydrocarbons (XPAHs). Concentration of XPAHs on atmospheric particulate matter were analyzed, and key influencing factors were explored by establishing relationships between concentration profiles and meteorological factors. Subsequently, through laboratory simulations, these factors were examined in depth, and the corresponding transformation mechanisms and products were identified. The overall idea of the study is complete and novel, and the experimental design is rigorous. The language and text are clear. However, there are still some issues that need to be considered and discussed. The comments are listed as follows.

Specific comments:

Line 27: “Transformation mechanism; Transformation pathways” or “Transformation pathways; Transformation mechanism”, which sequence would be more appropriate?

Lines 122-123: How much flux does a xenon lamp have? Is this comparable to the radiation from the sun?

Lines 173-174: “The detection limits (LODs) ranged from 0.17 to 1.9 fg/m³ for ClPAHs, and from 0.23 to 1.6 fg/m³ for BrPAHs.” Is there any reason for the variation of the values of LOD of ClPAHs and BrPAHs?

Lines 188-189: For example, “12.1±16.9 pg/m³” indicates the mean value, so it may not require to use mean with the mean value like (mean: 12.1 ± 16.9 pg/m³). So, it is suggested, no need to use mean with the mean value throughout the text,

Line 205: Kitazawa et al” not “KITAZAWA et al”,

Line 206: “----- highest molar mass -----“, Not “----- height molecular weight-

-----“,

Lines 2016, 219 and other parts, please check, weather article “the” is required before “winter” or other seasons?

Lines 280-281: ----- bromination degree ----- or ----- degree of bromination -----,

Lines 294-295: hydroxyl radical, $\cdot\text{OH}$,

Line 302: ----- which could participate-----,

Line 306: ----- 30 °C-----,

Lines: 311-314: The authors describe that the transformation rate of BrPAHs is higher than that of ClPAHs. This is due to the lower bond energy of C-Br (291 kJ/mol) compared to C-Cl (345 kJ/mol). Authors can think about the effect of humidity on Cl and Br atoms. The size of Cl atom is smaller than that of Br, so affinity of water molecule (vapor phase) would be higher for Br atom,

Line 433: The authors describe the effect of H₂O₂ as ROS species on the phototransformation, but what is the contribution of ozone on the phototransformation?.