

Supporting Information

Formation of halogenated disinfection by-products during ballast water chlorination

Hui Zhang^{a,b}, Junzeng Xue^{a,b}, Qiong Wang^{a,b}, Lin Yuan^{a,b}, Huixian Wu^{*a,b}

^a*College of Marine Ecology and Environment, Shanghai Ocean University,*

Shanghai, 201306, China

^b*Centre for Research on the Ecological Security of Ports and Shipping, Shanghai*

Ocean University, Shanghai, 201306, China

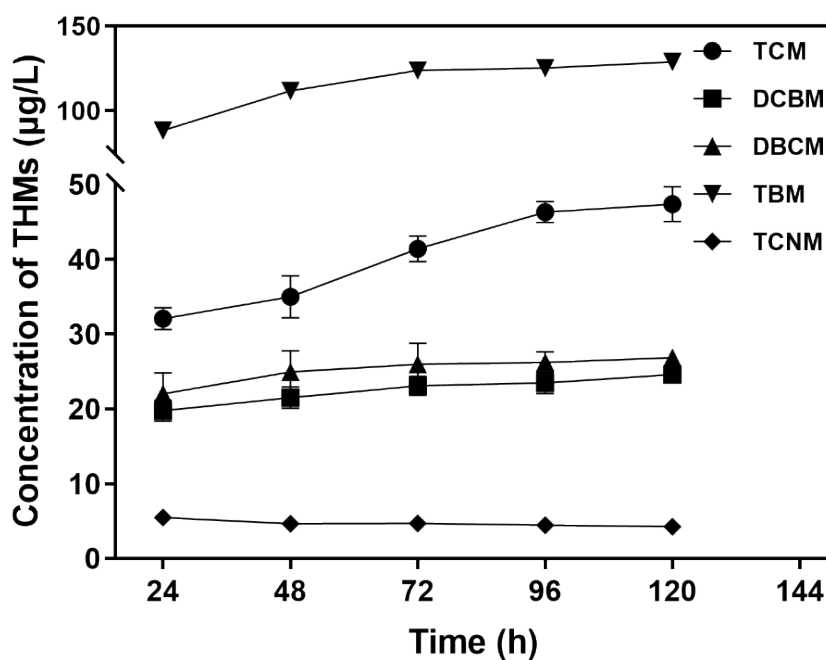


Figure S1. The formation of THMs during ballast water chlorination under a certain condition ($C(\text{NaClO})=10$ mg/L, $C(\text{TOC})=5.0$ mg/L, $C(\text{Br}^-)=68$ mg/L, $C(\text{I}^-)=60$ mg/L, $T=20$ °C, $\text{pH}=8$).

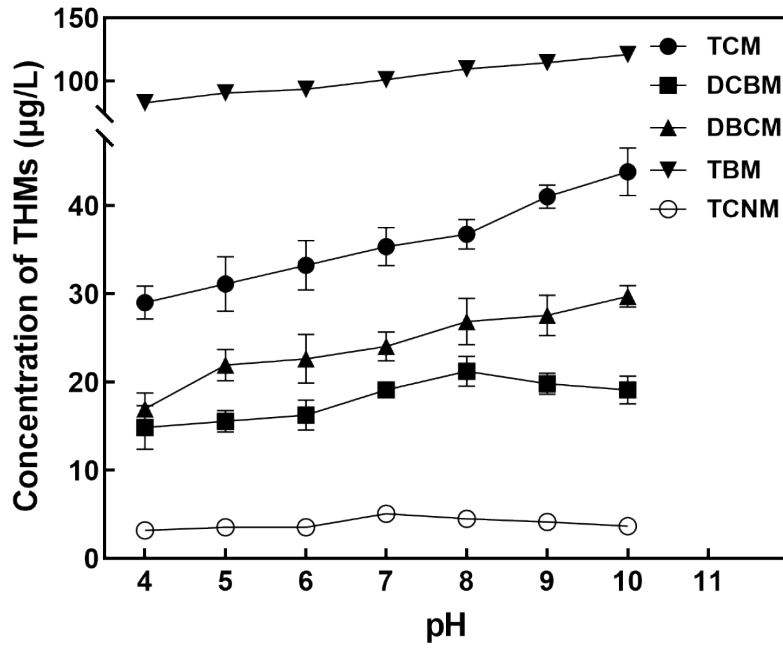


Figure S2. The effect of pH on the formation of THMs during ballast water chlorination under a certain condition ($C(\text{NaClO})=10 \text{ mg/L}$, $C(\text{TOC})=5.0 \text{ mg/L}$, $C(\text{Br}^-)=68 \text{ mg/L}$, $C(\text{I}^-)=60 \text{ mg/L}$, $t=48 \text{ h}$, $T=20 \text{ }^\circ\text{C}$).

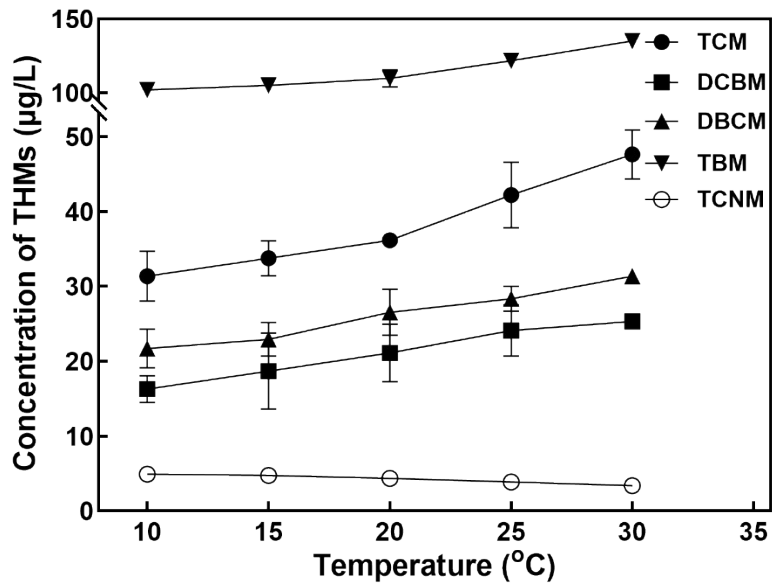


Figure S3. The effect of temperature on the formation of THMs during ballast water chlorination under a certain condition ($C(\text{NaClO})=10 \text{ mg/L}$, $C(\text{TOC})=5.0 \text{ mg/L}$, $C(\text{Br}^-)=68 \text{ mg/L}$, $C(\text{I}^-)=60 \text{ mg/L}$, $t=48 \text{ h}$, $\text{pH}=8$).

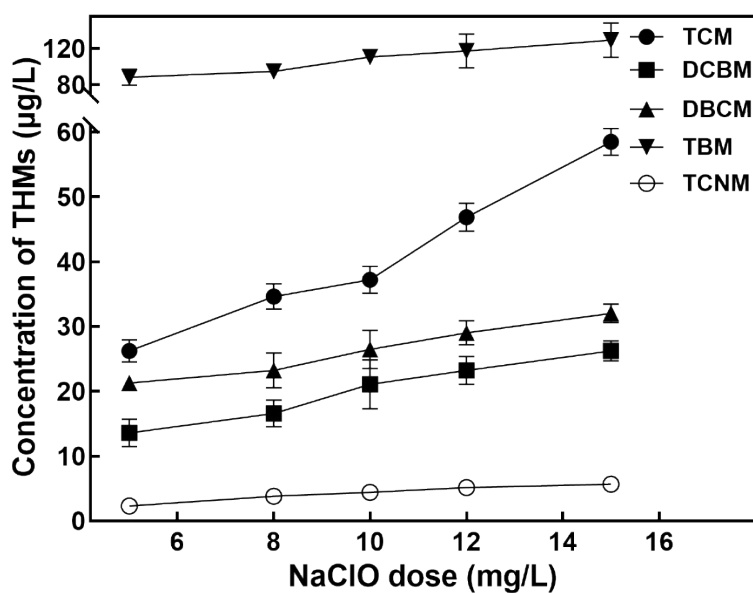


Figure S4. The effect of NaClO dose on the formation of THMs during ballast water chlorination under a certain condition ($C(\text{TOC})=5.0$ mg/L, $C(\text{Br}^-)=68$ mg/L, $C(\text{I}^-)=60$ mg/L, $t=48$ h, $\text{pH}=8$, $T=20$ °C).

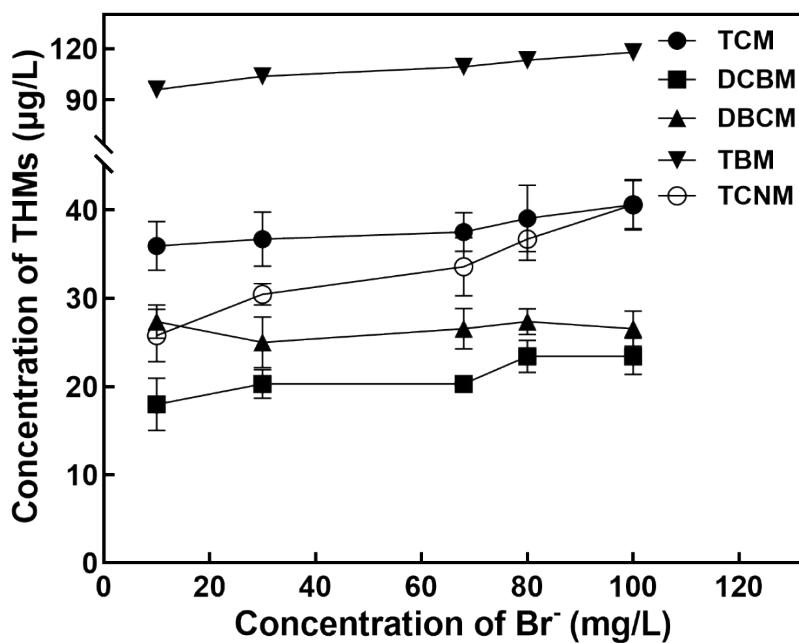


Figure S5. The effect of concentration of bromide on the formation of THMs during ballast water chlorination under a certain condition ($C(\text{NaClO})=10$ mg/L, $C(\text{TOC})=5.0$ mg/L, $C(\text{I}^-)=60$ mg/L, $t=48$ h, $\text{pH}=8$, $T=20$ °C).

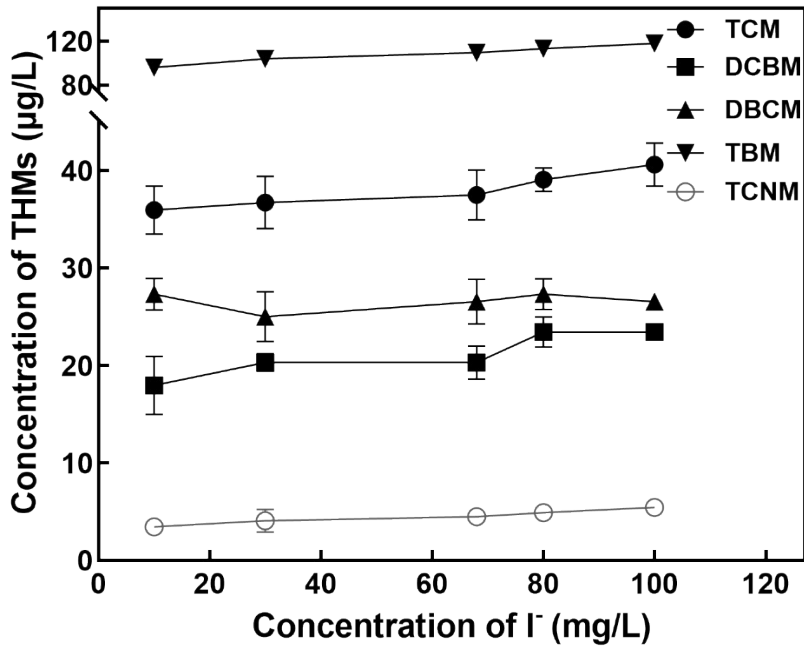


Figure S6. The effect of concentration of iodine on the formation of THMs during ballast water chlorination under a certain condition ($C(\text{NaClO})=10 \text{ mg/L}$, $C(\text{TOC})=5.0 \text{ mg/L}$, $C(\text{Br}^-)=68 \text{ mg/L}$, $t=48 \text{ h}$, $\text{pH}=8$, $T=20 \text{ }^\circ\text{C}$).

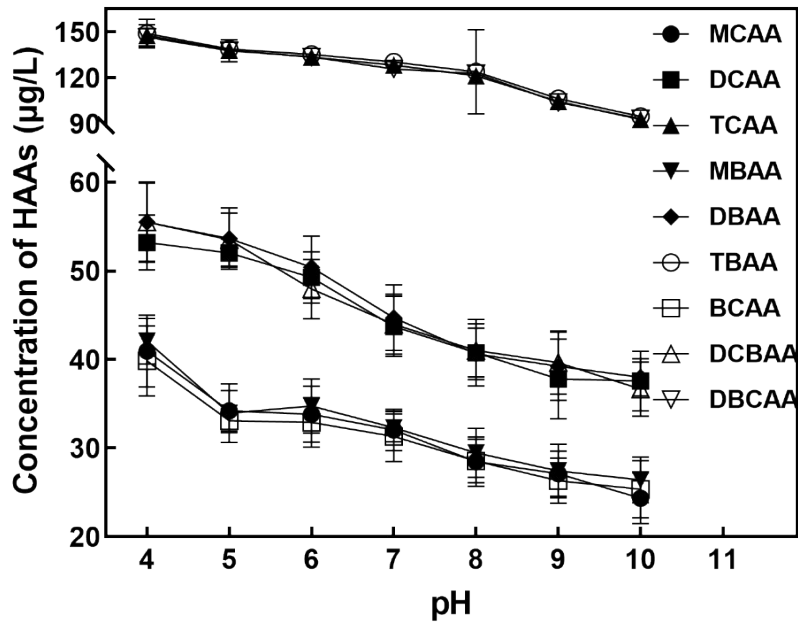


Figure S7. The effect of pH on the formation of HAAs during ballast water chlorination under a certain condition (i.e., $C(\text{NaClO})=10 \text{ mg/L}$, $C(\text{TOC})=5.0 \text{ mg/L}$, $C(\text{Br}^-)=68 \text{ mg/L}$, $C(\text{I}^-)=60 \text{ mg/L}$, $t=48 \text{ h}$, $T=20 \text{ }^\circ\text{C}$).

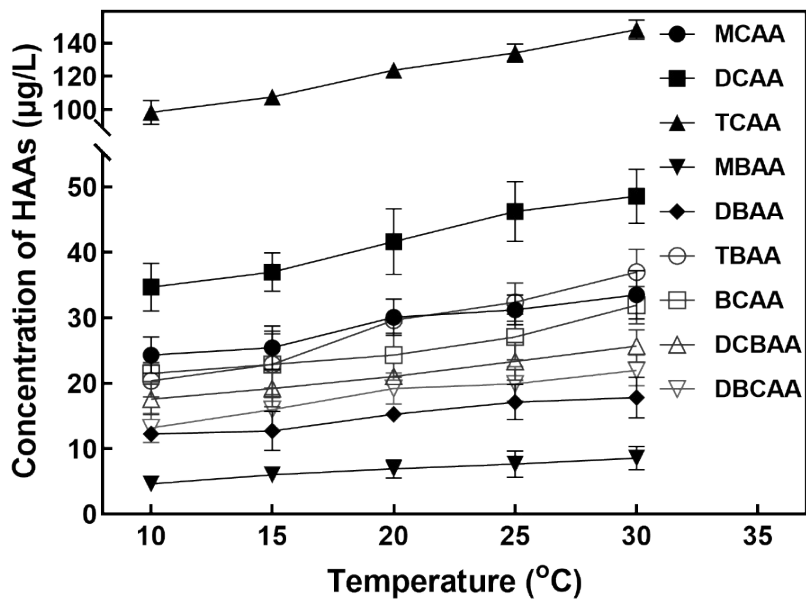


Figure S8. The effect of environment temperature on the formation of HAAs during ballast water chlorination under a certain condition (i.e., $C(\text{NaClO})=10$ mg/L, $C(\text{TOC})=5.0$ mg/L, $C(\text{Br}^-)=68$ mg/L, $C(\text{I}^-)=60$ mg/L, $t=48$ h, $\text{pH}=8$).

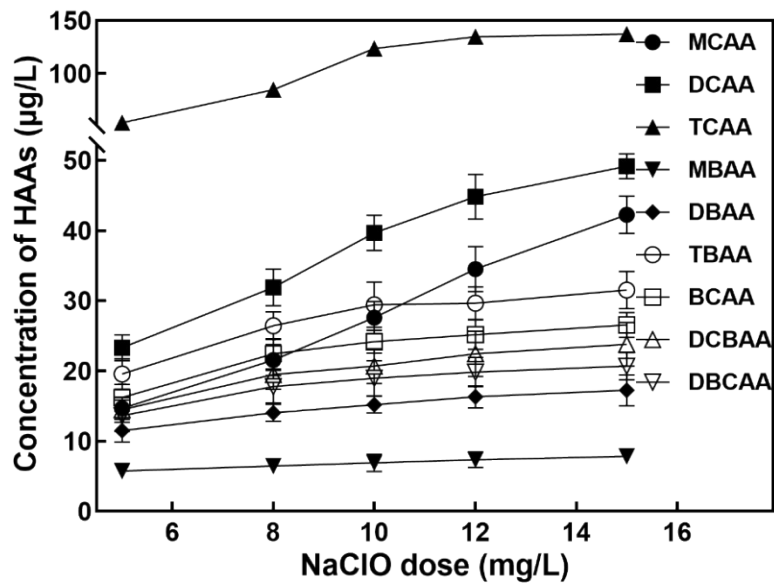


Figure S9. The effect of NaClO dose on the formation of HAAs during ballast water chlorination under a certain condition (i.e., $C(\text{TOC})=5.0$ mg/L, $C(\text{Br}^-)=68$ mg/L, $C(\text{I}^-)=60$ mg/L, $t=48$ h, $\text{pH}=8$, $T=20$ °C).

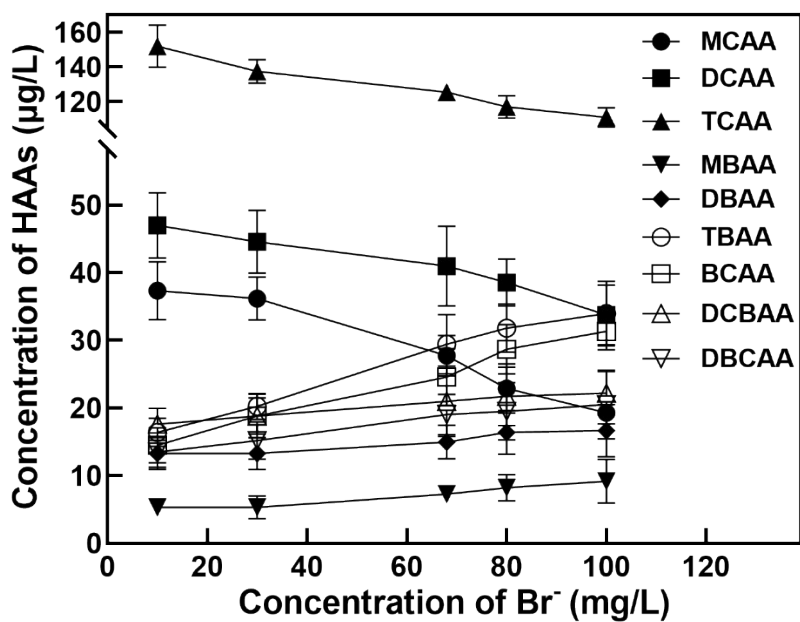


Figure S10. The effect of concentration of bromide on the formation of HAAs during ballast water chlorination under a certain condition (i.e., $C(\text{NaClO})=10$ mg/L, $C(\text{TOC})=5.0$ mg/L, $C(\text{I}^-)=60$ mg/L, $t=48$ h, $\text{pH}=8$, $T=20$ °C).

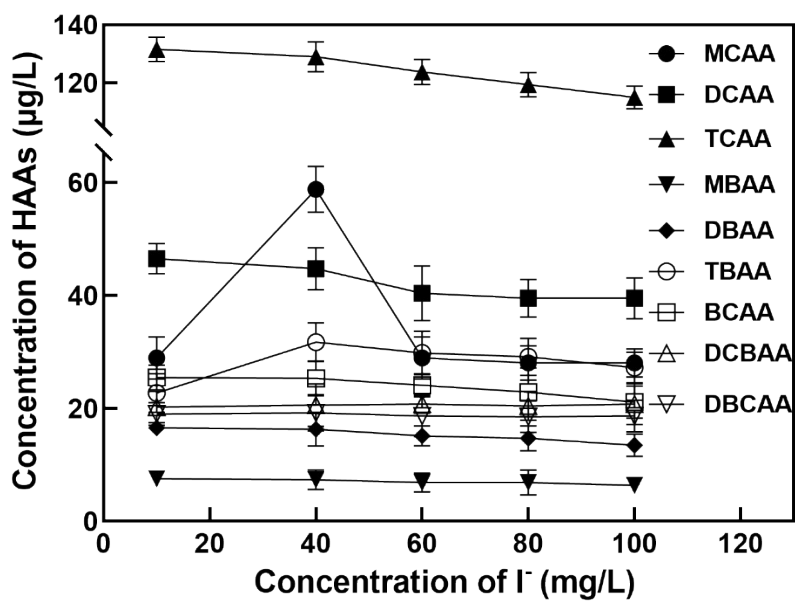


Figure S11. The effect of concentration of iodine on the formation of HAAs during ballast water chlorination under a certain condition (i.e., $C(\text{NaClO})=10$ mg/L, $C(\text{TOC})=5.0$ mg/L, $C(\text{Br}^-)=68$ mg/L, $t=48$ h, $\text{pH}=8$, $T=20$ °C).