

原 著

東京湾における有害化学物質のリスクトレードオフの研究 —TBT から CuPT への代替—

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2007年6月27日受付, 2008年2月6日採録

Abstract

We targeted Tokyo Bay to study the risk trade-off of substituting Copper pyrithione (CuPT) for Tri-butyltin (TBT) as an antifoulant. We estimated the ecological risk by assessing calcification of giant Pacific oysters (*Crassostrea gigas*). We estimated the environmental concentrations of TBT and CuPT using chemical fate model (FATE model). The risk assessment was used the uncertainty factor (UF) and margin of exposure (MOE) method.

For TBT, the ecological risk was estimated by the no observed effect concentration (NOEC: $0.001 \mu\text{g} \cdot \text{L}^{-1}$; calcification of giant Pacific oysters) and the UF (10). As a result, a high risk level was shown for all sea areas of Tokyo Bay. For CuPT, the ecological risk was estimated by the no observed effect concentration (NOEC: $0.25 \mu\text{g} \cdot \text{L}^{-1}$; Growth Reduction of *Skeletonema costatum*) and the UF (100). There is a high risk for the ports areas, but the risk was not of concern for other sea areas of the Bay. Regarding calcification of giant Pacific oysters, the risk was low for CuPT (EC_{50} : $11 \mu\text{g} \cdot \text{L}^{-1}$; UF 10) though it was high for TBT (NOEC: $0.001 \mu\text{g} \cdot \text{L}^{-1}$; UF 1) in all sea areas. It was suggested that the ecological risk to *C. gigas* in Tokyo Bay would greatly reduce by substituting TBT with CuPT. The risk evaluation of development inhibition of Bafununi (*Hemicentrotus pulcherrimus*) from CuPT (NOEC: $1.0 \mu\text{g}$, UF 10) was done for February 2007, which is the spawning season. The results show that the risk is low in all sea areas.

Keywords : Tributyltin, Copper Pyrithione, Chemical Fate Model, Tokyo Bay, Ecological Risk Assessment, *Skeletonema costatum*, *Crassostrea gigas*, *Hemicentrotus pulcherrimus*, Margin of Exposure, Risk trade-off