

Chapter 25

Overview

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Organotin compounds are amongst the worst environmental pollutants in history because of their unforeseen stability in the environment and adverse effects on marine organisms, including both direct toxicity and indirect consequences such as endocrine disruption. Many studies are addressed the spread of organotin contamination and the mechanisms for toxicity in aquatic organisms; these are summarized in dedicated sections on organotin compounds in this volume.

As a consequence of such research, the application of organotin compounds has now been banned by IMO and inputs to the marine environment will be reduced in the near future. However, to what extent and how quickly will organotin pollution be improved by this prohibition? The answer is uncertain. Many issues remain concerning the timescales of recovery of the marine environment from organotin contamination. Probably the most serious of these is the legacy organotin loadings in sediment. Organotin compounds may be reversibly adsorbed on to sediment, or entrained as paint particles, and are likely to remain stable for long time, with a strong possibility of gradual re-elution from sediment to the water column. Close to shipping channels, harbours and ports, dredging of heavily contamination sediment may be needed to maintain access, promoting the likelihood of enhanced remobilization. The spread of organotin contamination to the deep sea environment confirms concerns over long-distance transport and even indicates potential for recirculation back to coastal waters by currents. Furthermore, some fish back forth between deep sea and shallow coastal waters, crossing and extending contamination boundaries. These phenomenon present additional risks for marine organisms in shallow water, and, potentially, human consumers. The elucidation of contaminant transport processed to deep sea environments is an important prerequisite if steps are to be taken to reduce such pathways. Our closing concern is over organotins is the presence of relatively high concentrations in marine mammals compared other marine organisms. This is an emerging, and potentially serious, characteristic of organotin pollution and one which requires better understanding of the mechanisms of organotin metabolism in different taxonomic groups.

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Increasingly, restrictions on the use of organotin compounds will lead to a rise in the incorporation of alternative biocides in antifouling preparations. The environmental effects of these alternative biocides are evaluated in various countries. Unfortunately, the evaluations of environmental effects can differ significantly. One of the reasons for this difference in opinion is that the PEC (predicted environmental concentration) which is used in the risk assessment process, is estimated using modelling. These predicted values by modelling are difficult to validate for a number of alternative biocides, because the detection limits of current analytical methods are often higher than the predicted values. Therefore the development of highly sensitive analytical methods for these compounds is an important requirement. The unstable nature of several alternative biocide presents additional challenges since it is difficult to assess the threat of toxicity for marine organisms given the likelihood of transitions of many of these compounds in the environment. Established risk assessment protocols, as applied, for example to Persistent Organic Pollutants (POPs) may not be appropriate for some alternative biocides. The development of new risk assessment methods which consider the instability of the parent compounds is desirable.

Biocide-free antifoulants have been developed recently but there is no available information concerning the risks for marine life. Whilst extensive ecotoxicological impact would seem unlikely, the possibility of some environmental effects can not be ignored given that such coatings are designed to prevent the settlement of biota. We hope that these antifoulants undergo rigorous assessment of risks and benefits and that the threat is shown to be acceptably low, before widespread application: False assumptions made about the harmless nature of organotin antifouling have taught us expensive lessons about the folly of such actions without appropriate and environmentally relevant testing.

Without wishing to sound emotive, but on a more personal note, Dr. Ohji, one of the editors of this volume, became a parent in March, 2008. The eyes of the baby are clear and innocent. We guess from baby's eyes that there is anticipation to experience new world and hopefully a safe and comfortable world. This expectation applies to all animals on the earth. Our job as parents and guardians is to help fulfil these expectations. We hope that this book will make a useful contribution towards understanding and managing the specific issue of antifouling would like to appeal to all for "continuous efforts help restore and sustain a clean marine environment" for the benefit of future generations.

Finally, we would like to thank Springer for their encouragement and help in publishing this book.

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