亜鉛ピリチオンの銅イオン存在下での銅ピリチオンへの変化に関する実証毒性試験

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Abstract

It is generally accepted in paint industry that zinc pyrithiones (ZnPT) in antifouling paints containing copper oxides, may transchelate to copper pyrithiones (CuPT) owing to their metal exchange functions. However, transchelation of ZnPT to CuPT has not been proved by chemical analyses due to the difficulties in measuring both ZnPT and CuPT. To scientifically verify such transchelation, we carried out acute toxicity tests using nauplii of *Artemia salina*.

As the results, 24-h medium lethal concentrations (24-h LC_{50}) of ZnPT, CuPT and copper ions were 1.1, 0.1 and 4.0 mg/l, respectively. When concentrations of copper ions were in the range of 0.02～0.32 mg/l, 24-h LC_{50}s of ZnPT decreased to 0.10～0.15 mg/l. Similar trends were observed for CuPT. When the concentration of copper ions was 0.01 mg/l, 24-h LC_{50} of ZnPT was 0.20 mg/l, which was higher than that of CuPT. When concentrations of copper ions were 0.08～0.32 mg/l, 24-h LC_{50}s of CuPT were 0.10～0.13 mg/l, which was similar to the case of CuPT without copper ions.

From these results, even under experimental conditions, it seems that one mole of copper ions reacts with one mole of ZnPT without an excess amount of ZnPT because of high reactivity between them, leading to the subsequent production of CuPT in a short period of time.