Toxicity of arsenic and antifouling biocides to the marine plankton, Copepod *Tigriopus japonicus*

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In the present study we tested the toxicity of the antifouling biocides on marine plankton, Copepod *Tigriopus japonicus*. Because of their wide geographic distribution, rapid turnover time, and huge biomass, copepod species have been used for the best target marine biomass for testing antifouling effect. In order to examine antifouling effect and growth restricting mechanism, several reagent compounds including antifouling biocides and metal ions such as arsenic were used and their toxicity was examined. LC50 and LC10 of arsenic and antifouling agents were tested. The arsenic metabolite of arsenic species in copepod was analyzed using HPLC-ICP-MS. Method validation was made by analyzing certified reference materials (DORM-2, BCR 414). Toxicity of different antifouling agents on plankton species was verified by restrictions of their growth throughout periods.

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Effective application of analytical techniques such as ICP, ICP-MS, and XRF for the measurment of toxic elements discharge toward ocean from Li recovery pilot plant

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Pilot plant operation for the recovery of marine dissolved lithium by absorption onto lithium manganese absorbent will introduce chemicals which are eventually affect marine eco-system. In this study, we have tested and developed a fundamental analytical protocol in order to verify many hazardous chemicals such as heavy metals and organic pollutant. Testing the reliability of analytical technique become a major interest and achieving low-level detection limits is also tested. Application along with the use of LC-ICP-MS along with ICP-OES was examined to develop a rapid and simple method in seawater analysis for commercial purposes. XRF and other techniques were also used.

Application of ICP-OES (Ultima2C, JY) found to be a preferred technique for the analysis of low level concentration elements found in high matrix samples such as seawater. High matrix solutions are frequently affected in analyte response during instrumental analysis as the concentration of major component changed drastically. To overcome such a complication during standard sample preparation and a better application in pilot plant, a modified matrix matching standard addition method was developed and the reliability was checked carefully. Along this, ED-XRF Spectrometer (Epsilon5, PANalytical) was used and tested. This Epsilon5 spectrometer implements the 3-dimensional polarizing technique. The primary Gd-anode X-ray tube, secondary targets and measuring position are arranged in 3-dimensional space. In this way it completely removes background that may arise from primary X-ray beam scattering and thus vastly improves signal to noise ratio during seawater analysis.

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