

Title of Research:

23-6-01

Development of risk assessment method based on the concept of the bioavailability with a model predicting the toxicities for difficult-to-test substances.

Principal Investigator:

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Summary of Research:

In Japan, risk assessments of chemical are carried out based on the Chemical Substances Control Law. The risk assessments of difficult-to-test substances such as UVCB, which is a complex mixture of multiple substances, and cationic surfactants whose toxicity varies depending on water quality, have begun or is about to begin. Metals were once thought to be difficult-to-assess material because their toxicity varies depending on water quality. After the arise of the concept of "bioavailability", it was accepted that the varying toxicity of metals could be predicted with considerable accuracy, and now the ecological risk assessments are carried out with the concept. The toxicities of cationic surfactant also vary depending on the water quality; however, their characteristics of the toxicity variation depending on the water quality are similar to those with metals, and hence there is a possibility that we can predict such the varying toxicities by the bioavailability concept as well. The aim of this research is to quantitatively understand the toxicities of cationic surfactants, and to develop a model that predicts the toxicities to support the ecological assessments for such substances.

This year, we discussed: [1] effects of surfactants on water quality (hardness, ion concentration, etc.), [2] effects of surfactants on the available amount of cationic metals, [3] roles of DOC (humate) on the bioavailability of surfactants and [4] roles of algae of which toxicities will be investigated on the bioavailability of surfactant was investigated.

We found that [1] surfactants do not significantly change hardness or cation concentrations, [2] although further investigations remain, surfactants may not alter the bioavailability of cationic metals except a specific metal, [3] DOC alters the bioavailability of surfactants, thus the addition of DOC decreases the toxicity of the surfactants and [4] it seems to be unlikely that the presence of algae alter the bioavailability of surfactants.

Construction of a model for predicting the amount of bioavailability of the surfactants has also begun, and a preliminary model was developed in the limited water quality. The model will be developed next year to predict the toxicity of surfactants in various water qualities.

Timeline:

March, 1, 2023 -

Topics:

Oral presentation at the 2023 LRI research report workshop by JCIA (Tokyo)

Publications: