Culture of microalgae by artificial seawater and effect of organic acid on bioaccumulation

Yoshihiro Iwata and Kouhei Watanabe

Department of Chemistry, Faculty of Education and Human Studies, Akita University
1-1 Gakuen-Machi, Tegata, Akita 010-8502, Japan

Abstract

Organic acids such as carboxylic acid and humic acid in the sea water are very interesting because they have played the large role in the mass transfer in the ocean. By this research, it has checked that cultivation of marine micro algae (*Nannochloropsis sp.*) by the culture solution based on the artificial seawater purified ion exchange resin containing chelating reagent, nitrilotriacetic acid (NTA) and iminodiacetic acid (IDE). Although NTA inhibited the growth of algae, the number of cells required for PIXE analysis could be secured. Elemental abundance in micro algae incubated by culture containing chelating reagent or humic acid was quantified with PIXE. A 2.9MeV proton beam from a NMCC cyclotron bombarded the target for PIXE analysis of marine micro algae. The simultaneous determination of the main and trace elements in the algae sample was carried out by PIXE analysis. The temporary effect by chelating reagent and on the elemental abundance was obtained. NTA and IDE did not alter the abundance of calcium, magnesium, iron in algae, but NTA decreased the abundance of zinc. Although it seems that most of the metal elements in the algae exist stably, the possibility that the abundance of trace elements is affected by organic acids was suggested. Humic acid seems to have the potential to increase the abundance of calcium, chromium, iron, strontium in algae. Humic acid reduced the abundance of zinc. In this model experiment, it was shown that organic acids in seawater change elemental composition of micro algae and affect bioaccumulation.