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河川水中 SRP 濃度と正リン酸濃度の比較
Comparison of SRP (soluble reactive phosphorous) with orthophosphate in riverwater

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Introduction

Orthophosphate is essential nutrient for primary production in waters and it is thought to be the main chemical form of phosphorous directly available to organisms. In oligotrophic and mesotrophic waterbodies, phosphorous often plays as controlling factor of primary production. For the determination of phosphorous, spectrophotometric method based on the formation reduced form of phosphomolybdate (molybdenum blue) is usually applied Determined value is called as SRP: soluble reactive phosphorous, because various kinds of phosphorous compounds in water also reacts with molybdate by hydrolysis in acidic solution. Molybdemum blue method is very useful but this method does not show practical value of orthophosphate. The authors applied suppressed ion chromatography to determine solely orthophosphate. Obtained phosphate concentrations were compared with the values of SRP concentration for inflowing rivers of Lake Biwa, Japan (phosphorous limiting and mesotrophic freshwater lake).

Materials and Methods

River water samples were collected 4 times from April to November in 2014 at 7 inflow rivers (Yasu, Amano, Ta, Ane, Yogo, Nishino Creek of Yogo, Ado) of Lake Biwa, Shiga Prefecture, Japan. Water samples of Seta River, the only outflow river were also collected. Samples were filtered with a Nuclepore membrane filter (0.2?m pore size) and stored in a cool dark container below 10 degree in celcius. Orthophosphate concentration was measured by suppressed ion chromatography. Dionex AS-23A analytical column (250 was with electrochemical suppressor in electric suppression mode. Injection of high volume sample enhanced detection limit of orthophosphate to 10 nmol/L or less. SRP was measured according to the method JIS K0102 using ascorbic acid as reducing reagent. Micro glass cells of 50 mm path length (approximate volume: 3 mL), was used.

Results and discussion

Determined value of orthophosphate varied from 0.04 to 0.58 micro mol/L, while SRP showed values from 0.34 to 2.31 micro mol/L. There was so much difference between orthophosphate concentration and SRP in all river water samples collected. Ratios of orthophosphate to SRP in water differed between rivers sampled regardless of sampling season. In case of Yasu River, the ratio showed values from 0.06 to 0.14, while Ane River they were between 0.26 and 0.52. These differences might be caused by land use of watershed. In consideration of effects of river water quality to trophic status and primary production in Lake Biwa, these results might show the needs to consider direct impact of orthophosphate and indirect impact of other phosphorous compounds included in SRP separately.

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