Comparison of mercury bioacumulation within a trophic-web for pristine and anthropogenically contaminated aquatic ecosystems

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Lake Baikal-Angara River aquatic ecosystem includes natural basin of Lake Baikal (LB) with more than 360 inflow rivers, and few artificial basins such as Irkutsk, Bratsk and Ust'-Ilimsk Water-Reservoirs located downstream the only outflow Angara River. The main anthropogenic sources of Hg in the region were two chemical industrial factories "*Usol'ekhimprom*" and "*Sayanskkhimplast*", located on the shore of the Bratsk Water-Reservoir (BWR). Anthropogenic utilization of mercury is a global health issue due to its high degree of mobility, toxicity and bioaccumulation of methylmercury through the food-web.

Sediments, water, zoo- and phyto-plankton, different trophic level of fish and seal samples have been studied for Hg speciation and Hg stable isotopes (Table). Also main ecological parameter and carbon/nitrogen stable isotopes were charactarised for biological samples. Stable isotope Hg signature of LB plankton, fish and seal tissues showed positive correlation of δ^{202}Hg with trophic level. The comparison of the results obtained for contaminated and pristine sites suggests that Hg isotopic signature reveals both MeHg pathways in aquatic environments and trophic bioaccumulation routes.

Sample	$[Hg]_{tot}$	δ^{202}Hg	Δ^{199}Hg	%MeHg
Seal-muscle	300	+1.84‰	5.03‰	82.9‰
Perch(LB)	163	-0.48‰	1.14‰	95.1‰
Roach(LB)	58.6	-0.61‰	0.58‰	96.0‰
Plankton(LB)	2.1	-0.90‰	1.53‰	15.7‰
Pike(BWR)	3270	-0.18‰	0.04‰	90.6%
Perch(BWR)	1195	-0.26‰	0.52‰	92.0‰
Roach(BWR)	388	-0.17‰	1.19‰	94.2‰
Plankton(BWR)	3.6	-0.37‰	1.28‰	51.5‰

Table: Summarised total Hg (ng g^{-1}), MeHg content and isotope composition of Hg in some trophic web samples.

ICP-MS determination of trace elements in marine biological samples: Comparison of sample preparation procedures and selected digestion methods

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Marine biological samples (oysters, mussels, fish) can be used as bio-indicators to control the industrial pollution for the quality of aquatic environments and to investigate the toxicological impact for the different food chains. These samples with high sensitivity to toxic compounds in the surrounding water ecosystems are easily accessible resources that can be used for analysis.

Presented here is a comparison of two most used sample pretreatment techniques such as freeze-drying and fresh-freeze from the perspective of analytical efficiency and practical convenience of procedures applied to the processing of a considerable amount of samples. The concentrations of 20 elements in standard reference materials (SRMs) and different marine biological samples are studied and compared with previously published data. Validation of the pretreatment techniques are perform using several SRMs of oyster, fish and mussel tissues (1566b, 2977, TORT 2 and DORM 2) which display different matrix properties and large number of certified elements.