

## HEAVY METALS DETERMINATION IN FISH MUSCLES AND GILLS BY FAAS

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### Abstract

Heavy metals pose a great risk to human health due to the ability of bioaccumulation in fish tissues. The purpose of this research has been to determine the concentration of some of the heavy metals in muscles and gills of three different fish species. Two of them were freshwater fish while one was a sea fish.

The analyzed fish species were 1. *Cyprinus carpio*, 2. *Oncorhynchus mykiss*, and 3. *Dicentrarchus labrax*. The analytical technique we used has been the flame atomic absorption spectroscopy (FAAS). In fish muscles and gills, using three digestion methods, we have determined the concentration of these types of heavy metals: Fe, Cu, Zn, and Cr.

The average concentrations of heavy metals expressed in mg/kg (ppm) for three fish species were as follows: 1. *Oncorhynchus mykiss* - Fe 10.053 mg/kg (muscles), Fe 62.01 mg/kg (gills); Cu 3.4 mg/kg (muscles), Cu 3.45 mg/kg (gills); Zn 100.17 mg/kg (muscles), Zn 268.53 (gills); Cr N.D. (muscles), Cr N.D. (gills); 2. *Cyprinus carpio* - Fe 8.77 mg/kg (muscles), Fe 46.50 mg/kg (gills); Cu 3.2 mg/kg (muscles), Cu 3.17 mg/kg (gills); Zn 91.82 mg/kg (muscles), Zn 373.18 (gills); Cr N.D. (muscles), Cr N.D. (gills); 3. *Dicentrarchus labrax* - Fe 106.77 mg/kg (muscles), Fe 104.49 mg/kg (gills); Cu 3.41 mg/kg (muscles), Cu 3.22 mg/kg (gills); Zn 82.02 mg/kg (muscles), Zn 114.97 (gills); Cr N.D. (muscles), Cr N.D. (gills). The obtained results have shown the concentrations greater than the permissible levels for Fe and Zn according to FAO. The concentrations of Cu according to FAO/WHO and Cr according to USFDA have been within the permitted levels. A significant difference of accumulated metals in two analyzed fish tissues was also observed. In the habitat of freshwater fish the heavy metals concentrations have also been analyzed, including some other water parameters such as: pH, temperature, dissolved oxygen, and water conductivity. Average concentrations of heavy metals in the aquatic habitat of freshwater fish have been within the permitted levels according to WHO/US-EPA.

Found concentrations of Fe and Zn pose a risk to human health. The most efficient method for sample digestion has turned out to be the digestion method by aqua regia solution (HNO<sub>3</sub> + HCl) combined with perchloric acid (H<sub>3</sub>PO<sub>4</sub>), followed by HNO<sub>3</sub>, and dry ashing.

**Key words:** Flame Atomic Absorption Spectroscopy, Fish, Heavy Metals, Muscle, Gills.