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FEASIBILITY OF ALTERNATIVE ANALYTICAL LINES FOR SIMULTANEOUS DETERMINATION OF Cu AND Fe IN FISH BY HR-CS SS-GF AAS

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Fishes contain high amounts of unsaturated fatty witch in the presence of Cu and Fe can react with oxygen, leading to nutritional, sensorial and technological losses. Codfish (a carnivorous fish) is very susceptible to metals bioaccumulation, making necessary the determination of these elements. In addition, the Food and Agriculture Organization (FAO)[1], recommends the maximum limit of 30 μg g^{-1} for Cu in fish, while for Fe there is no limit recommended. Therefore, the goal of this work was to evaluate the feasibility of the simultaneous determination of Cu and Fe in codfish by high resolution continuum source solid sampling graphite furnace atomic absorption spectrometry (HR-CS SS-GFA AS). In this sense, different wavelengths combinations were investigated: "WC1": 249.215 and 249.064 nm; "WC2": 217.894 and 217.812 nm; and "WC3": 216.509 and 216.667 nm, for Cu and Fe, respectively. The samples were cut into slices, homogenized, lyophilized, milled and finally frozen, before the sample digestion for further determination by ICP-OES or evaluation by HR-CS SS-GF AAS. The pyrolysis and atomization temperatures were evaluated for standard solutions as well as for solid sample. Other parameters such as linear calibration range, the necessity of chemical modifier and the sample mass that could be analyzed were also evaluated. The pyrolysis and atomization temperatures optimized were 800 and 2200 °C, respectively and the use of chemical modifier was avoided. Up to 0.2 mg of sample could be used without under or overestimated results. The most extensive linear calibration range for Cu ranged from 2500 to 10000 pg (249.215 nm) while for Fe ranged from 50 to 5000 pg (249.064 nm), allowing the simultaneous determination in a wide concentration range. The accuracy was evaluated by results comparison with those obtained by ICP-OES after microwave assisted digestion in a closed system. Three samples were analyzed by HR-CS SS-GF AAS and the concentration for Cu ranged from 1.66 to 2.80 μg g^{-1} and for Fe from 9.8 to 25.8 μg g^{-1}. No statistical difference was observed between the results obtained by ICP-OES and HR-CS SS-GF AAS. All wavelengths monitored were suitable for the simultaneous determination of Cu and Fe and the higher LODs obtained were 3.76 and 2.41 μg g^{-1} (WC1), while de lower LODs were 0.09 and 0.05 μg g^{-1} (WC3) for Cu and Fe, respectively. It is important to mention that even using the poor sensitivity (WC1) was possible to achieve the recommended value by FAO for Cu. In addition, it was possible to determine Cu and Fe simultaneously in codfish samples by HR-CS SS-GF AAS using alternative analytical lines.

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References: 1 FAO (Food and Agriculture Organization), compilation of legal limits for hazardous substances in fish and fishery products (pp, 5-100), FAO Fishery Circular N°. 464,1983.