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Sequential injection method for iron speciation in natural waters using an hexadentate 3,4-HPO ligand

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Bidentate 3,4-hydroxypyridinone (3,4-HPO) chelators were successfully used as low toxicity chromogenic reagents for the determination of iron in natural waters [1]. Aiming to achieve a lower detection limit, we tested an hexadentate 3,4-HPO ligand, that provides the same coordination sphere for iron in a 1:1 molar ratio thus implying the use of a smaller amount of reagent. Moreover, the ligand has a higher solubility in water, thus avoiding the need to work with a saturated solution, as previously reported [1].

In this work, a spectrophotometric flow method using the hexadentate 3,4-HPO ligand for the iron speciation in natural waters is described. For that purpose, sequential injection (SI) analysis was chosen, combining advantages of automation, low sample and reagents consumption and waste production, with the facilitated interface for performing unit operations. The latter was important to enable matrix removal in a solid phase extraction (SPE) procedure using a chelating resin, nitrilotriacetic acid (NTA). The developed SI method for the spectrophotometric speciation of iron(III), with the possibility of in-line SPE, is shown in Fig. 1.

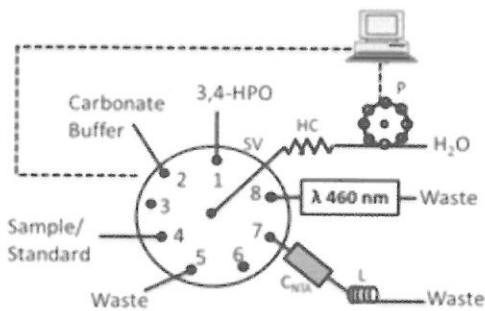


Fig 1. Sequential injection manifold for the determination of iron(III) using the 3,4-HPO ligand; SV, selection valve; P, peristaltic pump; HC, holding coil; C_{NTA}, column packed with NTA resin; L, coil with 75 cm length.

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