Smart sampling procedure for metal ions assessment in dynamic water systems

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Introduction

Water bodies are dynamic systems

High necessity to monitor metal ions

Can cause adverse effects to living microganisms:

- Toxic
- Carcinogenic
- Mutagenic
- Teratogenic

Aqua_Smart — Zn Cd As Cr Cu Pb Fe Hg

Project

Smart sampling | Real-time monitoring | In-situ systems

GREEN CHEMISTRY

Promoting **green chemistry** by employing techniques that significantly reduce the use of hazardous substances.

ONE HEALTH

Monitoring environmental changes in waters namely metal ions content, enables to prevent threats to public health.

Sampling *in situ* measurements





In situ probe measurements:

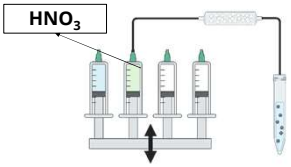
- pH
- Conductivity
  - Salinity
- Temperature
- Suspended solids
- Dissolved oxygen

Cadmium determination

In situ Smart Sampling

- Chelex 100
- Cadmium ions

Elution and Analysis



Multi-Syringe

Atomic Absorption Spectrometry (AAS)

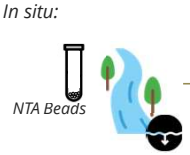
Main Results

- Sampling and pre-treatment performed *in situ;*
- Matrix discarded;
- Achieved a five-time pre-concentration of the sample.

Iron(II) & iron(III) speciation

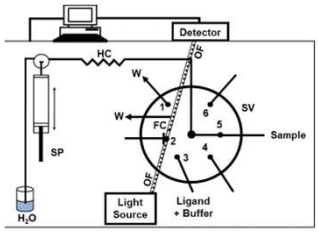
FIAlab

In situ:

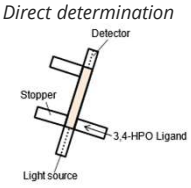


Fe^{2+} from the sample (direct determination)

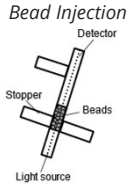
Fe^{3+} from the sample (bead injection)



Direct determination



Bead Injection

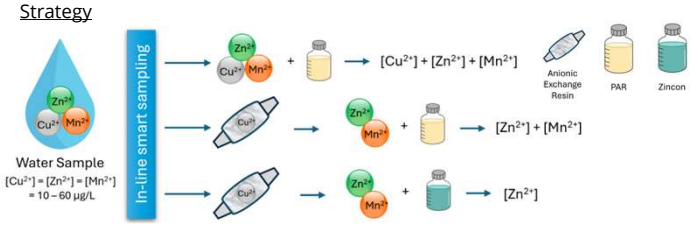


	Dynamic Range (mg/L)	Calibration Curve
Direct determination	0.05 – 2.0	A = 0.0417 × [Fe] + 0.013
Bead injection	0.25 – 1.0	A = 0.0237 × [Fe^{3+}] + 0.017

On going...

Cu^{2+}, Mn^{2+} and Zn^{2+} determination

Strategy



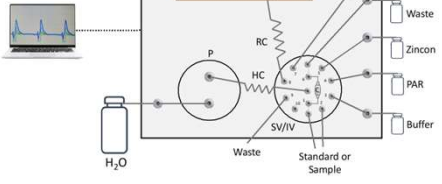
So far...

- ✓ Retention of Cu^{2+} using anionic exchange resin;
- ✓ Metal ions quantification with PAR;

On going...

- ✓ Optimization of quantification with Zincon.

System Manifold



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