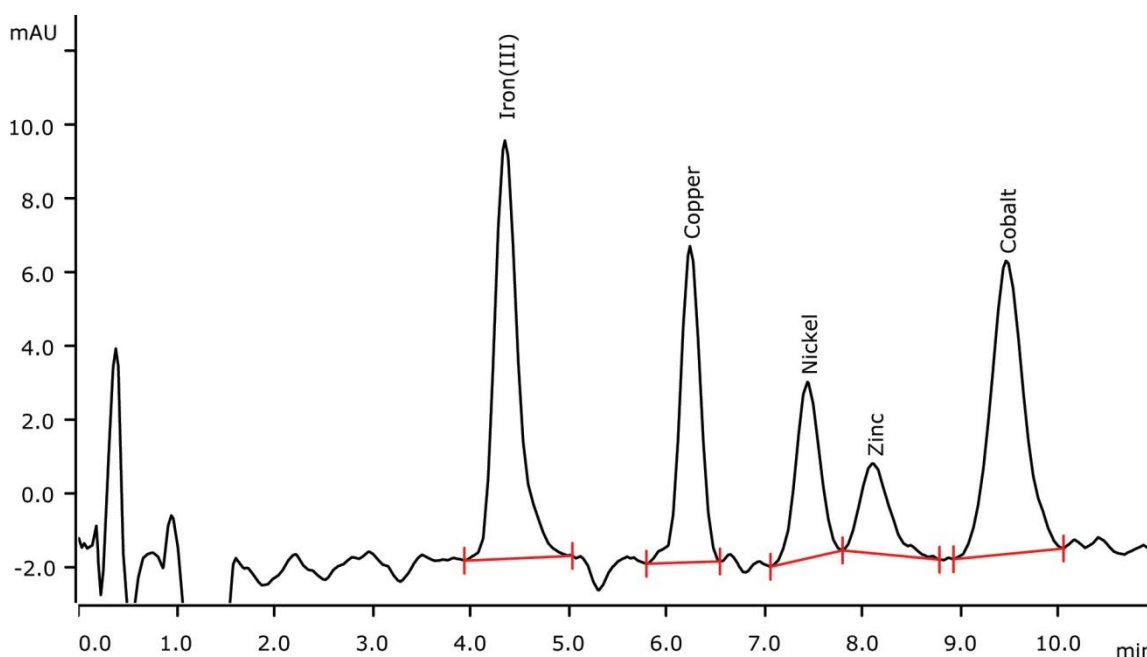


# Transition metals in feedwater using post-column reaction and subsequent UV/VIS detection



Feedwater for steam generation in boiling water reactors (BWR) needs to be analyzed for corrosion products. Presence of transition metals, mainly nickel and iron, indicates corrosion problems. Traces of these ions are determined using Inline Preconcentration (MiPCT). After separation, post-column reaction with 4-(2-pyridylazo)resorcinol (PAR) allows VIS detection at 510 nm.

## Results

	Concentration spiked [ $\mu\text{g/L}$ ]	Concentration found [ $\mu\text{g/L}$ ]	RSD (n=6) [%]
Iron(III)	1.0	1.01	4.9
Copper	1.0	1.00	2.5
Nickel	1.0	1.03	1.9
Zinc	1.0	1.05	6.5
Cobalt	1.0	1.03	1.9

## Sample

Spiked BWR feedwater sample

## Sample preparation

Inline Preconcentration (MiPCT)

## Columns

Metrosep A Supp 10 - 75/4.0	6.1020.070
Metrosep A Supp 10 Guard/4.0	6.1020.500
Metrosep C PCC 1 VHC/4.0	6.1010.320

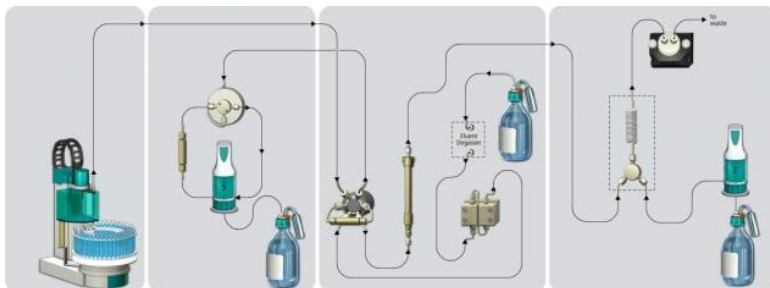
## Solutions

Eluent	7.0 mmol/L dipicolinic acid 5.6 mmol/L sodium sulfate 66 mmol/L sodium hydroxide 74 mmol/L formic acid pH = 4.0
PCR reagent	0.11 g/L PAR [4-(2-pyridyl-azo)resorcinol]; (ammonium acetate buffer)

## Parameters

Flow rate	1.0 mL/min
Flow rate PCR	0.2 mL/min
Injection volume	4000 µL
P <sub>max</sub>	20 MPa
Recording time	12 min
Column temperature	45 °C
Light source (VIS)	Tungsten halogen lamp
Wavelength	510 nm
Reference	790 nm

## Flow chart



## Instrumentation

850 Professional IC – Cation	2.850.1010
858 Professional Sample Processor	2.858.0010
887 Professional UV/VIS Detector	2.887.0010
886 Professional Reactor	2.886.0110
2 x 800 Dosino	2.800.0020

## Analysis

Visible detection after PCR

## Calibration MiPCT

Calibration range	Factor of 20
Standard solution:	
Multi-ion	10.0 µg/L
1. Level	200 µL = 0.5 µg/L
2. Level	400 µL = 1.0 µg/L
3. Level	800 µL = 2.0 µg/L
4. Level	2000 µL = 5.0 µg/L
5. Level	4000 µL = 10.0 µg/L



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