



MONITORING THE CONCENTRATIONS OF Co^{+2} , Ni^{+2} , Cu^{+2} & Fe^{+2} IONS IN A PROCESS STREAM



Interfering spectral features

All the mentioned above ions show interfering UV/Visible and SWNIR absorbance features. A full spectrum detector, such as a diode array, is therefore essential.

Quantitative determination

Process samples were collected and analyzed by the laboratory (atomic absorption technique). It was important to use samples that span the complete concentration dynamic range. The accuracy of the laboratory measurement determined the accuracy of the on-line measurement. The process samples were then inserted in the analyzer's flow cell, the absorbance spectra of the standards measured and a calibration and evaluation methods were developed. Once developed no re-calibration was required only occasional blanking of the system on water (the system can be set for auto blanking). The Run-time-on-line software was then used to continuously monitor the process water stream, and output the concentration values to a 4-20mA output or alternatively through the serial port communication protocol.

The Process

A cobalt recovery plant required a continuous on-line monitoring of a number of its process streams, monitoring low levels of Co^{+2} Ni^{+2} Cu^{+2} and Fe^{+2} .

Detection Method

An on-line UV/VIS diode array spectrophotometer was applied to this application, measuring absorbance spectrum from 190-1100nm with a 1nm resolution. The cobalt, nickel, copper and iron ions all show unique absorbance spectra, the intensity of which can be correlated to the concentration of these ions in the process stream. (See figure 1.) Absorbance values at certain wavelengths were correlated via a multi component calibration method to the metal ions concentrations.

Advantages:

- Wavelength reproducibility - no moving parts.
- Flexibility in selecting the optimal set of wavelengths to monitor.
- Fast response.
- No sample preparation.

Figure 1: Absorbance spectra , see table 1 for details.

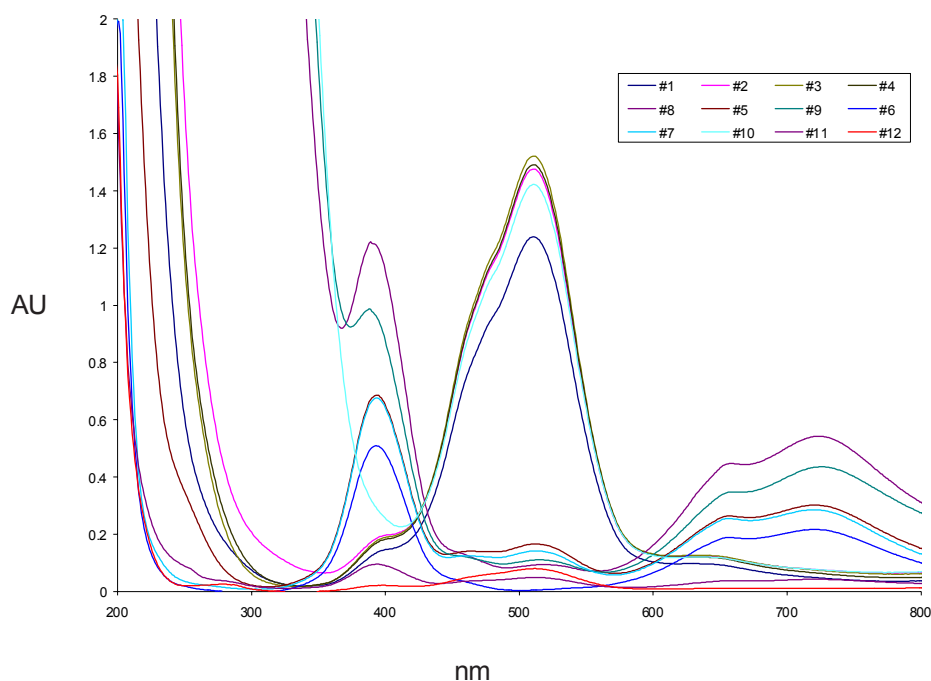


Table 1: Samples composition lab vs Diode Array in gr/l

	Co ⁺²		Ni ⁺²		Cu ⁺²		Fe ⁺²	
	lab	OMA	lab	OMA	lab	OMA	lab	OMA
1.	69.76	69.60	5.92	4.00	0.02	0.00	0.00	0.00
2.	84.40	84.20	4.03	5.70	0.50	0.50	0.02	0.02
3.	85.25	85.30	6.80	5.70	0.27	0.30	0.00	0.00
4.	83.95	84.00	5.35	5.40	0.06	0.04	0.00	0.00
5.	8.76	9.00	49.34	48.20	0.44	0.45	0.00	0.00
6.	0.05	0.00	33.80	28.90	0.00	0.01	0.00	0.00
7.	7.70	7.50	44.26	45.70	0.07	0.02	0.00	0.00
8.	4.01	4.00	72.61	70.20	2.20	2.20	1.99	2.00
9.	4.73	5.00	57.86	55.80	2.69	2.70	1.69	1.70
10.	76.65	76.40	2.90	5.40	0.49	0.50	0.79	0.80
11.	2.66	2.40	6.29	5.20	0.00	0.06	0.01	0.01
12.	4.10	4.00	0.49	1.20	0.00	0.00	0.00	0.00



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