

## Enhanced Spectroscopic Determination of Heavy Metals in the Environment by Complexation with AVN in Micellar Media

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### Extended Abstract

Complexation of heavy metals by dyes can be of high value in enhancing the sensitivity of their online monitoring in effluents (Khamis et al., 2007, Pourtedal et al., 2009, Sabel et al., 2010, Jumean et al. 2013). Complex formation between the dye acid alizarin violet (AVN) and  $\text{Cu}^{2+}$ ,  $\text{Ni}^{2+}$  and  $\text{Co}^{2+}$  was followed spectrophotometrically at pH 7.5, for dye/metal ratios in the range 0.5-10. Surfactants, particularly at micellar concentrations, have been found to improve the reliability of these methods. Measurements were performed in water and in micellar media at, below and above the critical micelle concentration (CMC). Micelles employed were the cationic C-TAB, the neutral TX-100 and the anionic SDS. For  $\text{Cu}^{2+}$ -AVN the main adsorption band shifted from 490 nm in water to 510 nm in the presence of C-TAB, with 57% increase in the molar absorptivity index. For  $\text{Co}^{2+}$ -AVN, three bands were observed, at 350, 480 and 560 nm, with the 480 nm made being the most sensitive. For  $\text{Ni}^{2+}$ -AVN, the main adsorption band shifted from 500 nm in water to 520 nm with nearly three-fold increase in the molar absorptivity index (from  $5.84 \times 10^3$  to  $1.55 \times 10^4 \text{ dm}^3 \text{ mol}^{-1} \text{ cm}^{-1}$ .) In the presence of both micellar SDS and TX-100, there was no significant change in the spectra of complexes when compared to those in water. Thus the maximum enhancement of in the spectrophotometric method for the determination of these metal ions with AVN occurred in the presence of CTAB. In addition, AVN in the presence of C-TAB was highly selective as a chelating agent for  $\text{Co}^{2+}$  in the presence of  $\text{Pb}^{+2}$  but the selectivity decreased in the presence of  $\text{Hg}^{+2}$ .

Heavy metals, AVN, metal-dye complexes, C-TAB, TX-100, SDS

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