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First- and Second-Derivative Spectrophotometry for Simultaneous Determination of Copper and Cobalt by 1-(2-Pyridylazo)-2-naphthol in Tween 80 Micellar Solutions

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Abstract: 1-(2-Pyridylazo)-2-naphthol (PAN) has been used for the simultaneous determination of copper and cobalt at trace levels. PAN at pH 1.89 forms red and green complexes with copper and cobalt, respectively, which are soluble in aqueous Tween 80 micellar media and are stable for at least 3 days. Under optimum conditions, calibration graphs were obtained for individual determination of copper and cobalt by zero- and first-derivative spectrophotometry and for simultaneous determination by first- and second-derivative spectrophotometry. Zero-crossing first-derivative spectrophotometry at 555 and 581 nm for cobalt and copper was used for the simultaneous determination, respectively. The second derivative method at 577 and 565 nm was also used for cobalt and copper simultaneous determination, respectively. The method enabled the determination of copper to cobalt ratios of 1:10 to 12:1 (Wt/Wt) accurately. The accuracy and reproducibility of the determination method on known various amounts of copper and cobalt in their binary mixtures were tested. Effects of diverse ions on the determination of copper and cobalt to investigate the selectivity of the method were also studied. The recommended procedures were applied to various alloys, different water matrices and vitamin B_{12} and B-complex ampoules.

Key Words: Copper, Cobalt, PAN, Simultaneous, Derivative spectrophotometry

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