

Simultaneous Determination of Co(II), Ni(II) and Fe(II) as 4-(2-pyridylazo) resorcinol complex by RP-HPLC

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Some of metal ions are the most dangerous pollutants due to their acute toxicity and carcinogeneticity. Exposure to high concentrations of these metal ions causes lung, nasal and throat cancers. Therefore, interest and demand is increasing for metal determination in biological and environmental samples [1]. Metal ions were generally determined with atomic absorption spectrophotometry or inductively coupled plasma-atomic emission spectrophotometry. But separation and simultaneous determination of mixtures of metal ions as their metal chelates with an organic chelating reagent by reversed-phase high performance liquid chromatography (RP-HPLC) had been accepted in inorganic analysis in recent years [2].

In this study, a reverse phase high performance liquid chromatography method for the separation and determination of cobalt(II), nickel(II) and iron(II) with PAR chelating on a C18 column was developed. A mixture of methanol-tetrahydrofuran (THF)-water (60:5:35 v/v) containing 5×10^{-5} mol/L PAR and acetate buffer solution (pH:5) was selected as mobile phase. Co(II), Ni(II) and Fe(II) metal ions react very rapidly with PAR to form pink colored complexes at pH 5. The maximum absorption wavelengths of the chelates are between 483 nm and 517 nm. These metals can be determined by RP-HPLC with spectrophotometric detection at 525 nm.

In this study, the effect of mobile phase pH on the retention time of the chelates, flow rate and PAR concentration of mobile phase are investigated. The calibration curves were prepared for these analysis. The peak areas were used to prepare calibration curve. The linear range is 50-2000 µg/L for Co(II), 10-500 µg/L for Ni(II) and 100-1000 µg/L for Fe(II), respectively. The relative standard deviations for three elements were found below 5%. The chromatographic method was applied to the various samples.

References

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