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Spectrophotometric Determination of Cobalt in Medicinal, Biological and Environmental Samples

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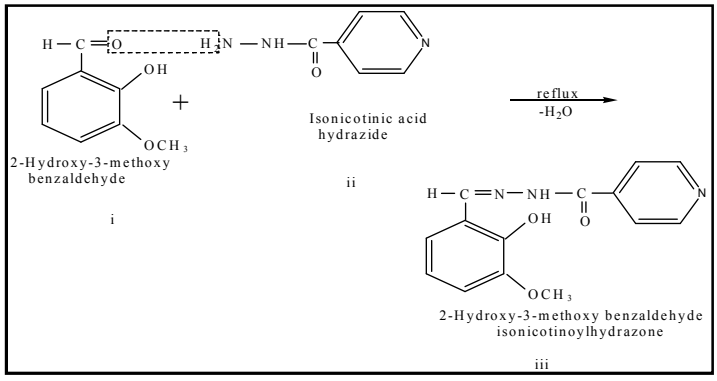
ABSTRACT

A simple, sensitive and rapid spectrophotometric method was developed for the determination of cobalt(II) using2-hydroxy-3-methoxybenzaldehydeisonicotinoylhydrazone (HMBAINH) as an analytical reagent. The metal ion forms a yellow colored complex with HMBAINH in aqueous dimethylformamide medium at pH 6.0 in presence of 1% triton x-100. The complex showed absorption maximum at 415 nm in the pH range 5.5-6.5. Beer's law was obeyed in the range of0.118-3.534 µg mL^{-1} of Co (II). The molar absorptivity and Sandal's sensitivity of the method were $3.5x10^4$L $mol^{-1}cm^{-1}$ and 0.00703 µg cm^{-2} respectively. The interference of various diverse ions was studied. The 2:3 (Metal:Ligand) complex was fairly stable(stability constant 2.72 $x10^{19}$). First and second order derivative spectrophotometric methods were also developed for the determination of cobalt(II) which showed greater sensitivity and selectivity. The proposed methods were applied for the determination of cobalt (II) in environmental, medicinal and biological samples.

Graphical Abstract



Synthesis of HMBAINH and its structure.

Keywords: 2-hydroxy-3-methoxybenzaldehydeisonicotinoylhydrazone (HMBAINH), Determination of Co(II), Medicinal and Environmental studies.