



RESEARCH ARTICLE

**A Spectrophotometric Simultaneous Determination of Cobalt (II) and Iron (III)  
With Res-Acetophenone Guanylhydrazone (RAG)**

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**ABSTRACT**

We report here a new simple effective spectrophotometric simultaneous determination of Cobalt (II) and Iron (III) with Res-acetophenone guanylhydrazone [RAG]. A standard procedure of the absorption spectra of the reagent and the complex is recommended. The absorbance measurements of Co(II) are carried out at 415 nm [Molar extinction co-efficient is  $0.4426 \times 10^4$  lit. mole  $\text{cm}^{-1}$ ] and at 520nm [Molar extinction co-efficient is  $0.1230 \times 10^4$  lit. mole  $\text{cm}^{-1}$ ] while of Fe(III) at 415 nm [Molar extinction co-efficient is  $0.1223 \times 10^4$  lit. mole  $\text{cm}^{-1}$ ] and at 520nm [Molar extinction co-efficient is  $0.2016 \times 10^4$  lit. mole  $\text{cm}^{-1}$ ] at pH 7.6. The method is applied for the determination of Cobalt and iron in steel alloy and synthetic mixtures.

**KEYWORDS**

RAG, Cobalt(II), Iron(III), Spectrophotometry

**INTRODUCTION**

Separate estimation of cobalt and iron in excess of other metal radicals is well developed and various reagents have been used for spectroscopic simultaneous determinations of individual element. Numerous methods for the spectroscopic simultaneous determination of cobalt and Iron have been reported<sup>1-5</sup>. Res-acetophenone guanylhydrazone (RAG) has been used as sensitive reagent for spectroscopic simultaneous determinations of Co (II) and Fe (III). It forms a yellow colored complex with cobalt and red colored complex with Iron at pH 7.6, which leads to the development of a simple and rapid simultaneous spectrophotometric determination of cobalt and iron at tracer level.

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**MATERIALS AND METHOD**

A standard solution of Co (III) (1 mg/ml i.e.  $1.6 \times 10^{-3}$  M) was prepared by dissolving 0.477 g of A.R. grade Cobalt sulphate heptahydrate in 100 ml distilled water. The solution was standardized with EDTA volumetrically.

A standard solution of Fe (III) (1 mg/ml i.e.  $1.7910 \times 10^{-2}$  M) was prepared by dissolving 0.308 g of A.R. grade Ferric ammonium sulphate monohydrate in 100 ml distilled water containing a 2-3 drops of sulphuric acid. The solution was standardized with Volhard's method volumetrically.<sup>7</sup>

A stock solution of  $0.5 \times 10^{-2}$  M reagent (RAG) was prepared by dissolving 0.104 g of it in 100ml ethyl alcohol. The buffer solutions were prepared by dissolving appropriate amounts of boric acid and sodium hydroxide.