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**New approach for the quantification of metallic species in healthcare products based on optical switching  
of a Schiff base possessing ONO donor set**

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**Abstract**

A new method is reported for the quantification of some metallic components of healthcare products utilizing a Schiff base chelator derived from 2-hydroxyacetophenone and ethanolamine. The Schiff base chelator recognizes some metallic species such as iron, copper and zinc (important components of some healthcare products), and cadmium (common contaminant in healthcare products) giving colorimetric/fluorimetric response. It coordinates with Fe<sup>2+</sup>/Fe<sup>3+</sup> and Cu<sup>2+</sup> ions via ONO donor set and switches the color to bright red, green and orange, respectively. Similarly, it switches 'ON' a fluorometric response when coordinates with Zn<sup>2+</sup> and Cd<sup>2+</sup> ions. In the present approach, detailed studies on the colorimetric and fluorimetric response of ONO Schiff base is investigated in detail. The Job plot for the complexation of ONO switch with various metal ions suggested formation of 1:1 (metal-chelator) complex with Fe<sup>2+</sup>, Fe<sup>3+</sup>, and Cu<sup>2+</sup> while 1:2 (metal-chelator) for Zn<sup>2+</sup> and Cd<sup>2+</sup> ions. The limit of detection, limit of quantification are 6.73, 18.0, 25.0, 0.65, 1.10 µM and 27.0, 72.0, 100.0, 2.60 and 4.40 µM for Fe<sup>2+</sup>, Fe<sup>3+</sup>, Cu<sup>2+</sup>, Zn<sup>2+</sup> and Cd<sup>2+</sup> ions, respectively. Under the optimized conditions, chelator was used for the quantification of important metals present in healthcare products via direct dissolution and furnace treatment during sample preparation. The results were found precise and accurate for both sample preparation techniques using the developed method.

**Key words:** ONO donor, Schiff base, 2-hydroxyacetophenone, ethanolamine, healthcare products, colorimetric switch, fluorimetric response

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**1. Introduction**

Nowadays, healthcare products play a pivotal role in improving the lifestyle and health. These are utilized in the form of medicines, cosmetics, multi-vitamin supplements, hair care products (including hair relaxers, conditioners and shampoos), skin care products (sunscreens, lotions), etc in daily life. Amongst various categories of healthcare products, metallic species are one of the most important constituents [1]. Various metallic species such as copper, iron, zinc, cobalt, etc. are essential for the growth and maintenance of body, therefore, are added in healthcare products commonly as ferrous glycine sulphate, zinc sulphate, ferrous fumarate, ferrous ascorbate, chromium picolinate, methyl cobalamin, copper propionate, etc. For instance, copper helps to keep the blood vessels, nerves,

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