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A novel spectrophotometric method for the determination of Taxim-of and Iron(III)

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ABSTRACT

Analytical determination of Taxim-of and Iron(III) in pharmaceutical formulation is carried and based on a colour reaction between the two. Iron(III) forms red coloured complex with Taxim-of in a buffer of pH – 4. This method can be conveniently used for the determination of Iron(III) and Taxim-of, in the ranges of Iron(III) 1.20 – 8.4 µg/ml and Taxim-of in the range of 1 to 6 mg/ml. The method is successfully applied for the determination of Taxim-of and Iron(III) in pharmaceutical formulation. Effect of various parameters, pH, metal ion concentration, drug concentration of solutions is studied. The optimum condition are established for the determination of Iron(III) and the drug.

Keywords: Spectrophotometric method[1], Taxim-of and Iron(III) system.

INTRODUCTION

Taxim-of is a synthetic chemotherapeutic antibiotic of the flouroquinolone drug class considered to be a second generation flouro quinolone. It is a combination of cefixime and ofloxacin. These two components contain oxygen and nitrogen atoms. Therefore they form complexes with transition metal ions.

Cefixime is an oral third generation cephalosporin antibiotic. It is used to treat sinusitis, tonsillitis, bronchitis, pneumonia, kidney infections and gonorrhea, oflaxacin is a racemic mixture which consists of 50% levofloxacin and 50% of its “mirror image”. Ofloxacin is a broad spectrum antibiotic that is active against both gram positive and gram negative bacteria. It is limited to the treatment of proven serious and life threatening bacterial infections.[2-3]

MATERIALS AND METHODS

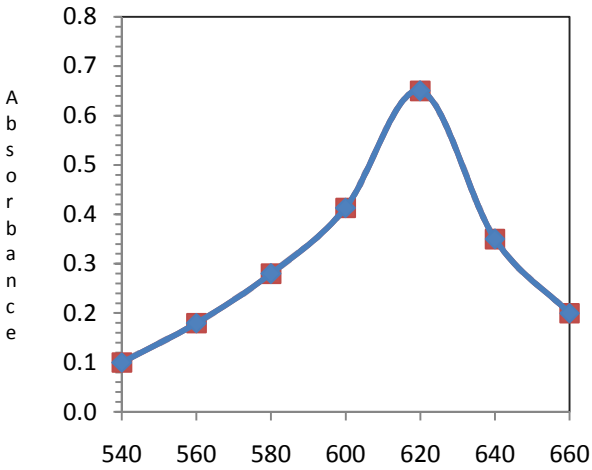
One ml each of ferrichloride [1 x 10^{-3}] and 1 mg/ml Taxim-of are taken in a 10ml standard flask. The solution is made up to the mark with a buffer solution of required pH and shaken well for uniform concentration. Similarly a blank solution is formed without the drug. The absorption spectrum is recorded in the wavelength a region of 400-750nm.

RESULTS AND DISCUSSION

Effect of pH

The effect of pH on the complexation is studied. The absorbance values increase from pH^{-1} to pH^{-10}, the colour and λ_{max} are observed that Fe(III) forms a red coloured complex in slightly acidic medium. Therefore a solution of pH-4 is chosen for further studies. The maximum absorbance is noticed at 620nm. The data is presented in

Fig-1: Absorption spectra of Fe(III) ion at pH 4
[Fe(III)] = 1 x 10^{-3} M *[Taxim-of] = 1 mg/ml*



Effect of metal ion concentration

The effect of Fe(III) ion concentration on the absorbance is studied. The concentration of metal ion is increased from 1 to 8 x 10 $^{-5}$ M. The concentration of Taxim-of is kept constant at 1 mg/gl. The pH of the solution is maintained at 4. From the result it may be concluded that Fe(III) can be determined in the range of 1.20 – 8.4 µg/25ml. The data is presented in fig 2.

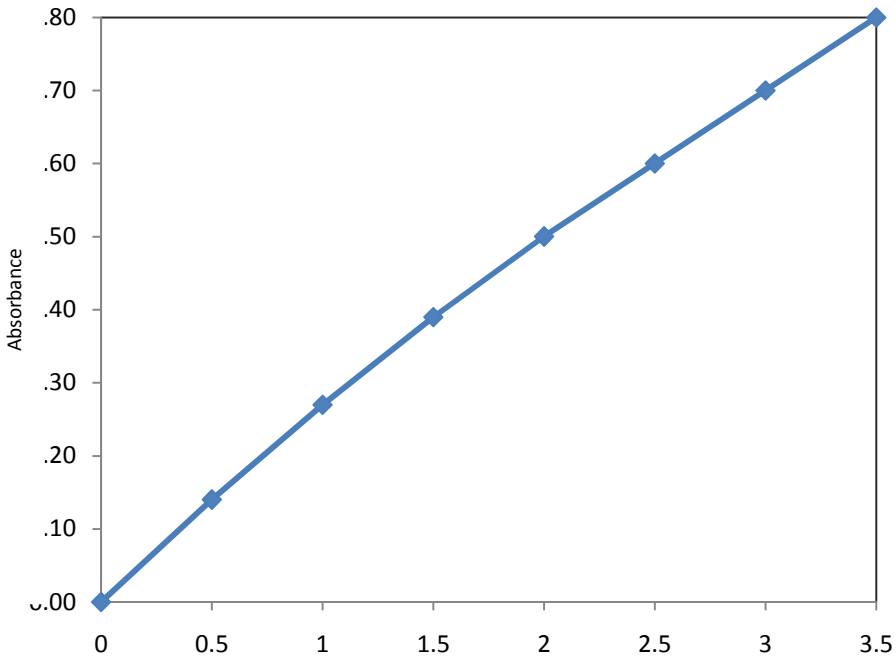


Fig-2

Effect of drug concentration

The effect of Taxim-of [5-6] concentration is studied in the range of 1 to 6 mg/ml. The absorbance values are measured at 620nm. The concentration of Fe(III) [7] is fixed 1 x 10^{-3} M. Using the present method the drug can be determined in the range of 1 to 6 mg/ml.

Effect of time on the reaction

The effect of time on absorbance is studied for a period of one hour for the same solution at regular interval of ten minutes. It is found that the absorbance values remain constant.

Effect of the organic solvents

Organic solvents generally influence a complexation reaction. Therefore effect of methanol, acetone, propanol, acetonitrile 50% by volume are investigated. An analysis of data reveals that the absorbance value is less when acetone is used as solvent with other solvents the change is not much. The data is presented in Table-1.

Table-1 Effect or organic solvents on absorbance

pH=4 λ_{max} *= 620nm [Fe(III)] = 1 x* 10^{-3} *M [Taxim-of] = 1 mg/ml*

S. No	Organic solvent used	Absorbance
1	No solvent	0.15
2	Methanol	0.14
3	Acetone	0.10
4	Propanon	0.15
5	Acetonitrile	0.10

Composition of the complex

The stoichiometry of the Fe(III) and Taxim-of complex is determined by Job's method of continuous variation. In the Job's [8-10] method a series of solutions containing varying volumes metal ion and Taxim-of solution of required concentration were taken in 10ml volumetric flask. The absorbance values of these solutions were recorded in each case and it is clear from the figure that Fe(III) forms 1:1 complex with reagent.

Effect of diverse ions

The effect of interfering ion on the determination of Fe(III) was investigated by adding known concentration of various anions and cations was determined. The tolerance limits of various ions are presented in table 2.

Table-2

Foreign Anions	Tolerance limit µg/ml	Foreign Cations	Tolerance limit µg/ml
Thiosulphate	15.5	Fe (II)	4.68
Oxalate	8.85	Cr (VI)	5.18
Nitrate	130.53	Se (IV)	5.45
Iodide	253.80	Pd (II)	0.12
Chloride	54.62	Cu (II)	0.45
Fluoride	20.54	Ni (II)	0.612
Acetate	43.70	Ti (IV)	6.96
EDTA	1667	Cd (II)	0.804
		Ru (II)	13.26
		Mo (VI)	19.2
		Sn (II)	14.84
		Zr (IV)	10.73
		Sr (II)	12.75
		Al (II)	13.49
		Mn (II)	19.98
		Mg (II)	32.41
		U (VI)	82.80
		W (VI)	63.95
		La (II)	52.91
		Th (IV)	64.01

CONCLUSION

The proposed procedure is simple, sensitive and rapid it is possible to determine the metal ion and Taxim-of in the range of 1.20 – 8.4 µg/25ml and 1 to mg/ml respectively.

Simple, selective an spectrophotometric methods are developed for the determination of Taxim-of. The procedure is based on the observation that Taxim-of forms coloured complex with Fe(III). The proposed methods can be employed for the analytical determination of metalion, in the range of micrograms. The method is successfully applied for the determination of Taxim-of in pharmaceutical formulation.

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