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Research Article

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Spectrophotometric Methods for the Microdetermination of Hostacycline and Doxycycline

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Abstract New, rapid and sensitive spectrophotometric method have been developed for the determination of Hostacycline (HTC) and Doxycycline (DC). The procedure is based on the observation that, HTC and OTC form coloured complexes with Chromium(VI). The absorbance of which is proportional to the amount of tetracycline present. The variables affecting development of the colour have been investigated and conditions are optimized. Beer's law is obeyed in the range 0.01 to 0.06 mg/ml for HTC and 0.01 to 0.08 mg/ml for DC. The proposed can be employed for the analytical determination of Chromium(VI). The present methods are successfully applied for the determination of HTC and DC in pharmaceutical formulation.

Keywords Spectrophotometric determination, Hostacycline, Doxycycline, Chromium(VI)

Introduction

Hostacycline (HTC) is a bright yellow crystalline salt. It is stable in air but darkens in colour upon exposure to strong sunlight. HTC is stable in acid solutions having a pH higher than 2. It is capable of forming chelate complexes with metal ions such as Calcium and Magnesium etc.

A more recent addition to the tetracycline group of antibiotics available for antibacterial therapy is doxycycline (DC). It is very well absorbed from the gastro intestinal tract. Thus allowing a smaller dose to be administered. High tissue levels are obtained with it and unlike other tetracyclines. DC apparently does not accumulate in patients with impaired renal function. It is preferred for urenic patients with infections outside the urinary tract.

Materials and Methods

Apparatus

Spectral measurements are performed on an Elico SL UV-visible spectrophotometer. The pH measurements were made using an Elico pH meter.

Preparation of Solutions

Double distilled water is employed for the preparation of solutions. All chemicals and reagents used for these studies are analytical grade obtained from Merck.

Recommended Procedure

Know aliquots of the buffer solution of required pH, Chromium(VI) solution and HTC, DC were pipette into 25ml standard flask. The contents of the flasks is made up to the mark with double distilled water and shaken well for uniform concentration. The absorption spectra are recorded against the respective blank solution.

Results

Effect of pH

Absorption spectral characteristics were studied in the pH range 1 to 8 and the absorption spectrum of the complex recorded. The HTC-Cr(VI) complex exhibits maximum absorbance at 370nm at pH 5 (Fig-1) and those corresponding to DC-Cr(VI) complex are 364nm at pH 4 (Fig-2).

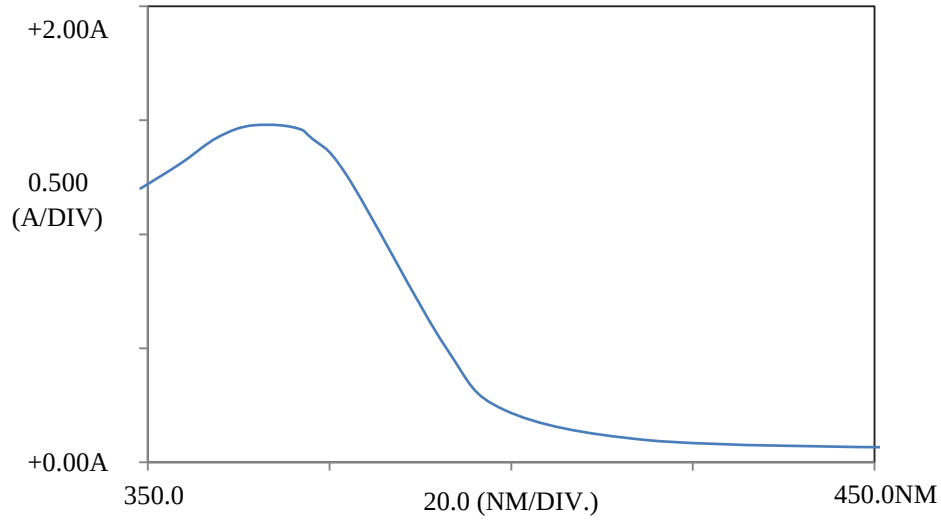

Figure 1

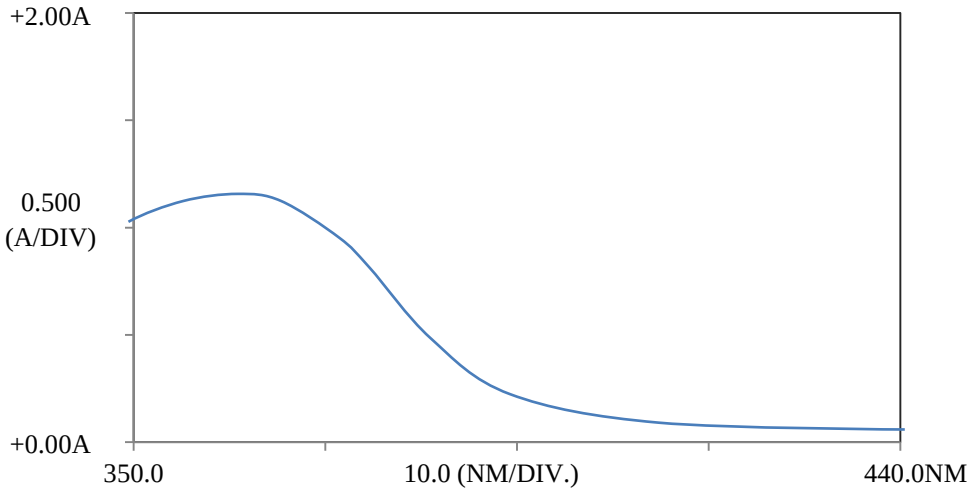

Figure 2

Effect of Time

The absorbance values of the complex solution are recorded over a period of two hours at regular intervals of time. The absorbance values are found to be approximately constant indicating that the complex formed is quiet stable over a period of 2 hours.

Metal Ion Concentration

The concentration of drug was maintained constant. Studies relating to the effect of metal ionconcentration were carried out by varying the Cr(VI) concentration [1-4]. The linear calibration plots are shown in Fig-3 and Fig-4 respectively for HTC and DC. The corresponding Beer's law ranges are 0.01 to 0.06 mg/ml with HTC and 0.01 to 0.08 mg/ml with DC.

Interference Studies

The metal ions cobalt, nickel, manganese seriously interfere in the determination of chromium(VI). The other metal ions do not interfere in the determination to the extent of 50 fold chromium(VI) concentration. The anions such as chloride, nitrate, sulphate, oxalate, fluorides and acetate ions do not interference even if they are present to the extent of 50 fold chromium(VI).

Composition of the Complex

The complex solution exhibits an colour in the case of HTC and DC. The author conducted Job's method of continuous variation to determine the stoichciometric ratio of HTC and DC to chromium(VI). The corresponding Job's curves [5-6] are shown in Fig-5 and Fig-6 for HTC and DC respectively.

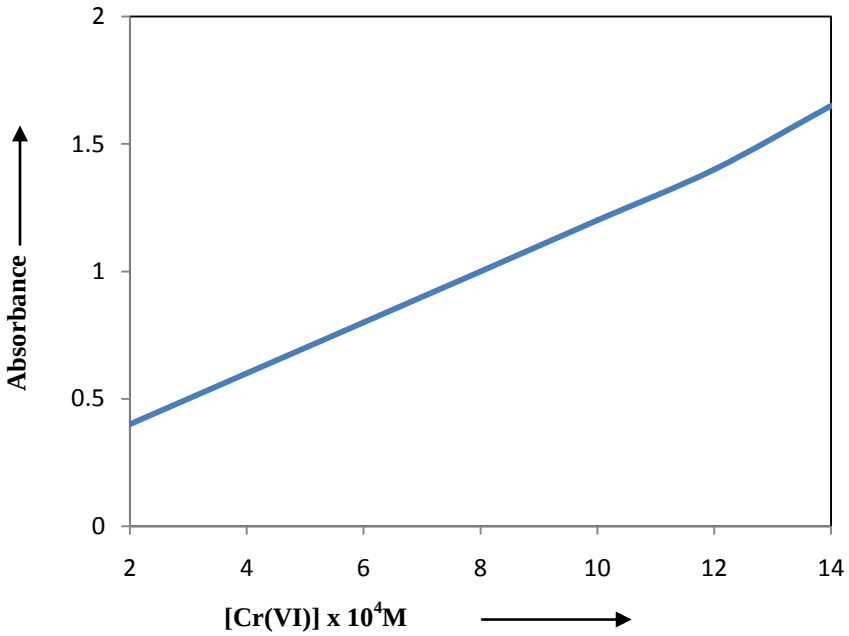

Figure 3

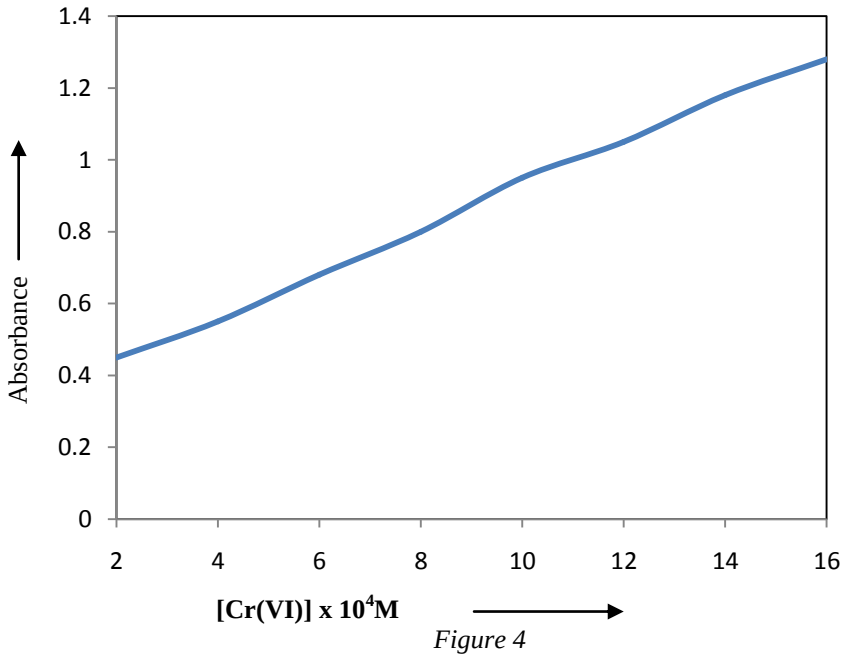

Figure 4

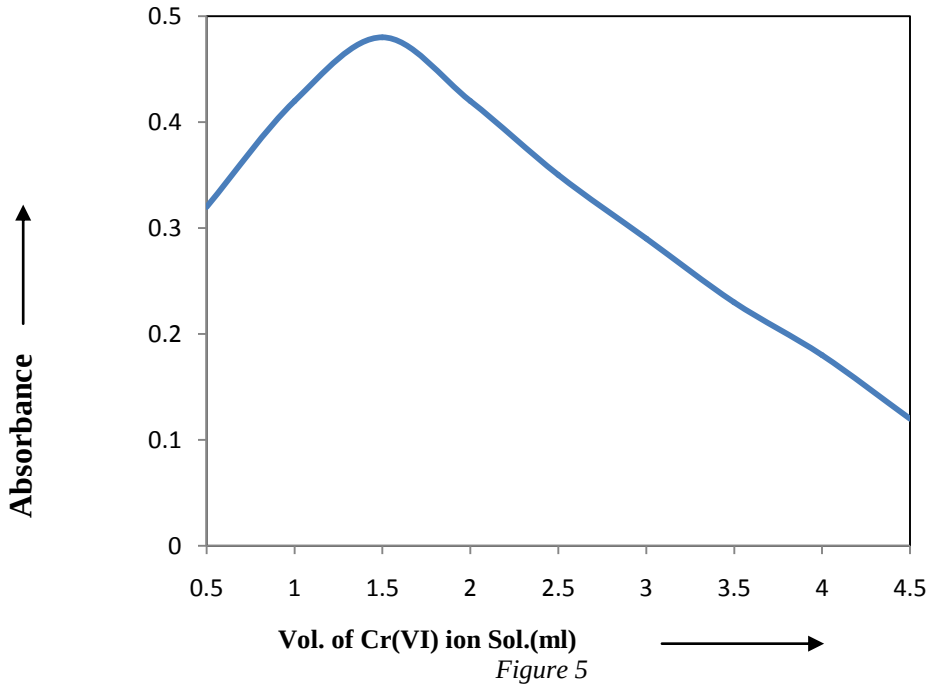

Figure 5

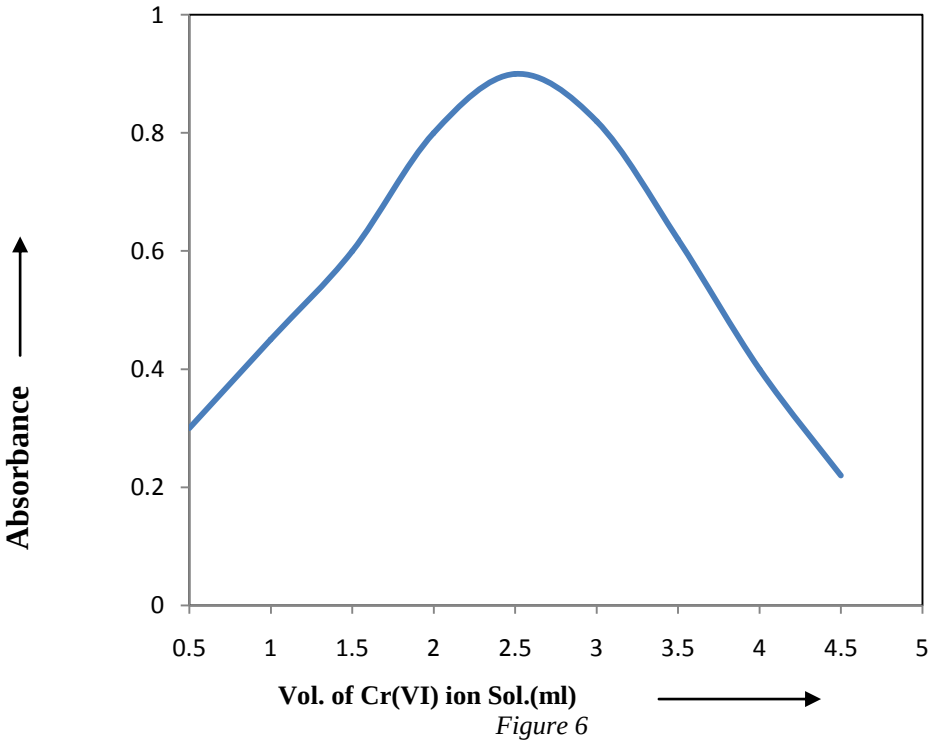

Figure 6

Discussion

HTC and DC form colour solutions with Cr (VI). Results reveal that a pH of 5 and 4 is optimum for the complexation of Cr(VI) with HTC and DC respectively. The HTC (or) DC – Cr(VI) complex is found to be highly stable and reproducible in these media. The media of lower pH are not recommended as the HTC and DC are not stable in highly acidic solutions. The selected pH is used to determine the composition of corresponding complexes. In order to establish the stoicheiometry at the complex [7-8]. The equimolar solutions of HTC (or) DC and Cr(VI) are mixed in different proportions. A solution of composition 1:1 for DC and 1:2 for HTC.

Application To Pharmaceutical Samples

Results of analysis of HTC and DC in pharmaceutical formulations using the proposed method is listed in Table-3.

Table 3: Determination of HTC / DC in pharmaceutical samples

Sample	Labeled amount Mg/Tab (or) Cap	Amount found Mg/Tab (or) Cap	Recovery %
	Hostacycline		
Resticlin	500	495	99.0
Idilin	250	242	96.8
Tritetra	333	329	98.7
	Doxycycline		
Vibazine DT	100	97.9	97.9
Retodox	100	98.2	98.2
Doxy-1	100	99.8	99.8

Conclusion

The proposed methods are rapid, simple and can readily be adapted for the routine analysis. The method is successfully applied for the micro-determination of these drugs in pharmaceutical samples.

References

1. Sandell, E.B. "Colorimetric determination of trans of metals", Inter Science, New York, 367 (1950).
2. Turczan., J. and Lau-Cam C. Spectroc. Lett., 17, 353 (1984).
3. Utpal Saha Analyst, 114, 1179 (1986).
4. Sultan, S.M., Analyst 1986, 111, 97.
5. Tolstoi L.G., Medcap Pharmacotherapy 4(1), 2002.
6. Jamaluddin Ahmed, M and Shah Alam, MD (2003) Spectroscopy 17, 45-52.
7. Ramadevi, B. and Rao, V.S.N., Indian J. Pharme Sci., 1993, 1, 40.
8. Suryanarayana Rao, V. The East Pharm., 1994, 1075.