

Spectrophotometric Determination of Oxytetracycline in Pharmaceutical Dosage Forms

M. BASANTI RAO, P.S. RAMAMURTHY AND V. SURYANARAYANA RAO*

Dept. of Chemistry, J.N.T.U. College of Engineering, Anantapur.

* Dept. of Chemistry, S.K. University, Anantapur.

Received 5 October 1995

A spectrophotometric method has been developed for the determination of oxytetracycline (OTC) in pharmaceutical formulations based on a colour reaction with uranium (VI). A well defined peak is observed at 413 nm. Oxytetracycline can be determined even in microgram quantities.

OXYTETRACYCLINE belongs to the class of tetracycline antibiotics. Tetracyclines are used all over the world. For instance, in Japan, 60% of antibiotics used in veterinary medicine are tetracyclines¹. Tetracycline class includes many derivatives such as oxytetracycline, chlortetracycline, doxycycline and dimethyltetracycline. Oxytetracycline is a product of the metabolism of the microorganism *Streptomyces rimosus*. It is a yellow, bitter, odourless powder, which is sparingly soluble in water. It complexes with many metal ions^{2,3}.

Reddy and Rao⁴ made a study of uranyl tetracycline complex. The study was performed in a solution at pH 1.3 and the complex composition was established to be 1:1. Sultan⁵ proposed a method for the spectrophotometric determination of tetracycline using sodium molybdate. This method is also developed in an acid medium and reaction takes place at high temperatures. A spectrophotometric method for the determination of oxytetracycline using sodium tungstate was reported by Jelikev⁶. This method is applicable for the determination of oxytetracycline in microgram range.

Absorbance measurements were made on a Shimadzu - 160 spectrophotometer (Japan) using quartz cells with a pathlength of 1 cm. The pH measurements were made on a digital pH meter of Elico (Hyderabad). Oxytetracycline used in the present investigation was of Pfizer Ltd., (Bombay). Uranyl

nitrate used was of A.R. grade and was obtained from Qualigens (Bombay). A standard 0.1 M solution of uranyl nitrate was prepared using double distilled water and was used as a stock solution. Oxytetracycline solution was prepared by dissolving 50 mg of the powder in 100 ml. of double distilled water. (The solution was prepared fresh every day.)

In a 25 ml volumetric flask, 10 ml each of buffer solutions ranging from pH 2 to pH 9 were taken followed by 3 ml of oxytetracycline solution and 2 ml of 0.01 M uranium (VI). The contents of the flask were then made upto the mark using double distilled water. Blanks were prepared in the same way but without containing any metal ion. The spectra were then recorded for each, in the range 350 nm to 500 nm. It was observed that at pH 6 a well defined and sharp spectrum was obtained. At pH values lower than 6, the spectra were of poor quality and in solutions of pH higher than 6, it was observed that the solution slowly turned turbid. Thus pH 6 was chosen to perform detailed studies on this system.

The λ max of the spectral curve is found to be 413 nm, and this wavelength was used throughout the study. Solutions containing different concentrations of the metal ions were taken at a fixed concentration of the drug. The absorbance were measured against a blank. A graph was plotted between metal ion concentration and absorbance. A linear relationship was obtained. The experiment was

Table - 1

Drug	Theoretical	Found employing Present method (a)	% Recovery
1*	100 mg/100 ml	99 mg/100 ml	99%
2*	100 mg/100 ml	102 mg/100 ml	102%

(a) Average value of six determinants

1* Indian Drugs and Pharmaceuticals Ltd., Rishikesh, India.

2* Sarabhai Chemicals, Baroda, India.

repeated by varying the concentration of the drug solution while keeping the metal ion concentration constant and the absorbance was recorded against a corresponding blank. The absorbance values obtained were plotted against the concentration of drug solution. A straight line was obtained.

A mixture containing uranium (VI) and oxytetracycline exhibited a well defined spectrum with λ_{max} at 413 nm. This can be explained on the basis of formation of a complex between uranium (VI) and oxytetracycline. The formation of the complex is also established by Job's method. It was also observed that the absorbance value did not show much variation, even after a period of 2 hours. Thus the colour formation appears to be immediate and stable. The effect of organic solvents such as methanol, DMF, acetone did not show much interference with the absorbance, cations, such as thorium (IV), tungsten (VI), manganese (II), chromium (VI) and cobalt (II) upto 0.01 M concentration did not have any influence on the absorbance. Also the presence of anions such as acetate, oxalate, chloride, fluoride and sul-

phate upto 0.1 M concentration did not show any effect on the absorbance.

The method proposed is quite simple and quick and can be used to detect microgram quantities of oxytetracycline present in pharmaceutical samples. This method is also applied successfully to other pharmaceutical samples containing oxytetracycline. The results are shown in Table-1.

REFERENCES

- Hassan, S.M., Ameer, M.M. and Ahemd S.A., *Mirochin. Acta.*, 1984, 111, 165.
- Albert, A and Reese, C.W. *Nature* (London), 1963, 172.
- Albert, A and Reese, C.W. *Nature* (London), 1956, 177.
- Reddy B.S. and Rao, B. *J.I.C.S.*, 1980, 7, 440.
- Sultan, S.M. *Analyst*, 1986, 97, 111.
- Jelikev, M. *Analyst.*, 1989, 114, 719.
- Rama Devi B. and Rao, V.S. *Indian J. Pharm. Science.*, 1993, 55, 40.