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THE DETERMINATION ENOXACIN IN TABLETS BY POTENTIOMETRY AND CONDUCTOMETRY

POTANSİYOMETRİK VE KONDUKTOMETRİK YÖNTEMLE TABLETLERDE ENOKSAZİN TAYİNİ

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Enoxacin(ENX) is one of the new generation fluorinated quinolones structurally related to nalidixic acid. The determination of ENX by potentiometry and conductometry is described and the application procedures to the pharmaceutical preparations are presented. UV- Spectrophotometric method was chosen as a comparison method. Considering the evaluations as a whole insignificant difference at the 95% probability level was observed. In the analysis of tablets(400 mg ENX), the relative standard deviations were 0.52 and 0.67 for potentiometric and conductometric methods, respectively. The developed methods were practical and suitable for the quantitative determinations and routin analysis of ENX.

Enoksazin (ENX) yapı olarak nalidiksik asit'e benzeyen, yeni bir florlu kinolondur. Bu çalışmada ENX tayini için potansiyometrik ve kondüktometrik yöntemler geliştirilmiş ve farmasötik preparatlara uygulanmaları sunulmuştur. Karşılaştırma yöntemi olarak UV-spektrofotometrik yöntem seçilmiş ve %95 olasılık düzeyinde, yöntemler arasında fark olmadığı gözlenmiştir. 400 mg ENX içeren tabletlerin analizinde relatif standart sapması, potansiyometri için 0.52, konduktometri için ise 0.67 olarak bulunmuştur. Geliştirilen yöntemlerin rutin kantitatif ENX analizleri için pratik ve kullanışlı olduğu saptanmıştır.

Keywords: *Potentiometry, Conductometry; Determination of enoxacin, Pharmaceutical applications*

Anahtar Kelimeler: *Potansiyometri; Konduktometri; Enoksazin tayini; Farmasötik uygulamalar.*

Introduction

Enoxacin (ENX), a fluorinated quinolone, is an antibacterial agent which exhibits excellent antimicrobial activity against gram-positive and gram-negative microorganisms (1). For the determination of ENX, HPLC (2-3), TLC-fluorescence spectrodensitometric (4), polarographic and voltammetric (5), polarographic, cyclic voltammetric and potentiostatic-coulometric (6), polarographic (7, 8), differential pulse polarographic (9), linear sweep voltammetric (10), fluorescence spectrophotometric (11) and capillary electrophoretic (12, 13) studies have been published. In this study, the determination of ENX by potentiometry and conductometry is described and the application procedures to the tablets are presented.

Material and methods

Apparatus and chemicals: WTW Multiline P4 Universal pH-meter-conductometer cabled WTW Sen-Tix 97T pH electrode and WTW Tetracon 325 conductometric electrode cell

(Germany), a Shimadzu Spectrophotometer Model UV 2401 PC (Japan) and quartz cells in the measurement of the absorbance were used. Standard ENX (sesquihydrate, 99.8%) and tablets (Enoksetin®) were kindly supplied from Eczacıbası Ilac San. ve Tic. A.S. (Istanbul,Turkey). Standard ENX was used without further purification. Other chemicals were of analytical grade of E.Merck (Germany).

Procedures

1. Potentiometry and conductometry: Standard ENX was weighed, transferred to a beaker, added 30 ml ethanol and titrated by 0.1680 mol-L^{-1} NaOH. Buffer solutions of pH 4.87 and 8.05 for pH-meter, 0.01 mol-L^{-1} KCl for conductometer were used in the calibration. Both electrode were submerged into the titration solution, pH and conductivity were recorded at the same time of each titrant volume addition. Standard SLD was used without further purification.

2. Spectrophotometry: A series of standard ENX dilutions in the concentration range $1x10^{-5}$ and $5x10^{-5}$ mol-L^{-1} was prepared using $1x10^{-3}$ mol-L^{-1} stock solution. As the solvent of ENX 0.1 mol/l NaOH was employed. Calibration equation was calculated measuring the absorbance values of the standard solutions at 266 nm.

3. Assay procedure for tablets: Twenty tablets were weighed and the average weight of a tablet was calculated. The tablets were finely powdered, and the amount equivalent to an average tablet was weighed, transferred to a beaker, added 30 ml ethanol and titrated by standard NaOH.

Results and discussion

Experiments were realized by submerging the glass and platinized platinum electrode into the same test solution. After addition of each titrant volume, the variations in the pH and the conductivity were recorded. Plotting the pH and conductivity versus the addition of titrant volume, well-defined S-shape potentiometric and good conductometric graphs were obtained. Both graphs are illustrated in the Fig.

At the beginning of titration, the solution of ENX was turbid but its transparency increased gradually around the equivalence point. The equivalence

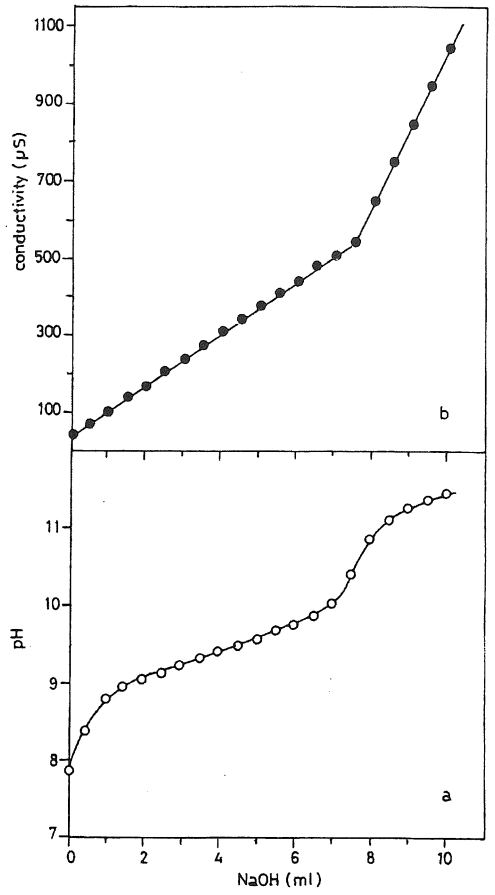

Fig. Potentiometric (a) and conductometric (b) curves for the titration of ENX(400 mg) with 0.1680 mol/L NaOH.

points of ENX were calculated using second-derivative curve and the intersection point for the potentiometric and conductometric methods, respectively.

Spectrophotometry was chosen as a comparison method for the determination of ENX. The absorbance of ENX in 0.1 mol-L^{-1} NaOH solution was measured at 266 nm where ENX absorbs the ultraviolet light at a maximum. The

relationship between absorbance (A) and concentration (C) was found to be: A = 32268 C (mol/l) + 0.005; r = 0.9999. The determination methods progressed in the study were applied to the pharmaceutical dosage forms and the results tabulated in the Table. It was observed that the differences among the methods are insignificant at the 95% probability level(F- and t-test). As the conclusion, the methods proposed in this study can be used accurately and practically for the routin analysis of ENX.

Table. Assay results of ENX as percent in tablets*

	Potentiometry	Conductometry	UV-Spectrophotometry
mean	99.4	99.7	99.6
n	8	8	8
SD	2.08	2.67	2.27
Confidence limit(p=0.05)	±1.17	±2.20	±1.90
t-test of significance	0.21	0.09	$t_{0.05}$=2.14(table)
F-test of significance	1.19	1.38	$F_{0.05}$=4.17(table)

*Each tablet contains 400 mg of ENX

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