

## Analysis of Ofloxacin using UV Spectrophotometer

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### Abstract

Ofloxacin belongs to the class of Fluoroquinolones antibiotics. This class of antibiotic is used for the treatment of both gram positive and gram negative bacterial. A Simple, easy, economical and quantitative analytical method has been applied for the determination of ofloxacin using active and pharmaceutical dosage form with 2 different brands including Oflox400mg tablets manufactured by Indus Pharma Batch # 1008 and Tarivid 200mg tablet manufactured by Sanofi Aventis Batch # WD057. The maximum absorbance was detected at wavelength 294 nm using distilled water as a solvent. The linearity of the method was analyzed, ranging from 3.125ppm to 25 ppm and is found to be satisfied. Beers law was observed in the concentration range of 3.125-25 ppm with correlation coefficients 0.988, 0.998, 0.920 for standard, Oflox and Tarivid respectively which meet the criteria mentioned in the ICH guide lines (Figure 2-4). The linear regression equation obtained by least square regression method were  $y = 0.073x + 0.105$  for active,  $y = 0.111x + 0.199$  for Oflox and  $y = 0.12x + 0.527$  for Tarivid which also meet the criteria mentioned in the ICH guide lines, where y is the absorbance and x is the concentration of the pure drug solution.

**Keywords:** Ofloxacin; Analysis; UV

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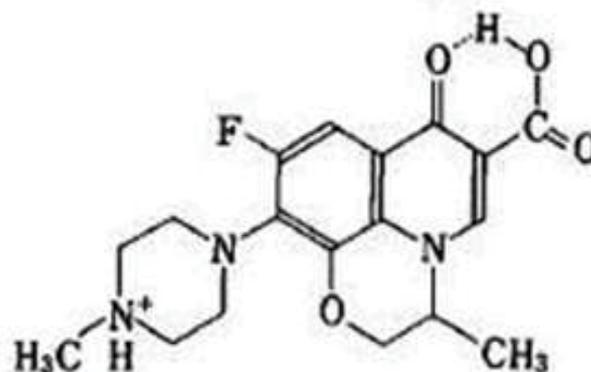
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## Introduction

Heterocyclic quinolones stand for diverse biological and chemical reactivity [1]. The Quinolonecarboxylic acids, carboxyquinolones, or 4-quinolones are a group of synthetic antibacterials structurally related to nalidixic acid. The term 4-quinolone has been used as a generic name for the common 4-oxo-1,4-dihydroquinoline skeleton. Under this system nalidixic acid, a naphthyridene derivative, is an 8-aza-4-quinolone, cinoxacin, a cinnoline derivative, is a 2-aza-4-quinolone, and pipemidic and piromidic acids, pyridopyrimidine derivatives, 6,8-diaza-4-quinolones [2,3] (Figure 1).

Quinolones present a high degree of reticence against microorganisms. [4,5] Its inhibition for the gyrase enzyme is set by 2 genes *gyrA* and *gyrB* [6]. Gyrase inhibition is its primary inhibition effect. The study highlights Inter Pro Scan and molecular docking indicating that its the interaction ofloxacin and moxifloxacin with proteins which is hypothetical in nature with a conserved domain which causes the inhibition [7]. It suppresses gram negative and gram positive bacteria and caters both gram positive and gram negative bacterial infections [8,9]

.It has a wide variety of applications as antibacterial, Anti-Infective Agents, Urinary; Nucleic Acid Synthesis Inhibitors [10]. Ofloxacin is substantially potent against Escherichia coli which is a challenge for other drugs like chloramphenicol and rifampicin [11]. Ofloxacin (OFL) a fluorinated carboxyquinolone, chemically is a racemate (+)-9-fluoro-2,3-dihydro-3-methyl-10-(4-methyl-



**Figure 1** Chemical structure of ofloxacin [3].

1piperazinyl)-7-oxo-7H-pyrido[1,2,3-de]-1,4benzoxazine-6-carboxylic acid. [12] Bacterial DNA gyrase, as compared to other enzymes is susceptible to 4-quinolone antimicrobials including ofloxacin which possess an additional killing mechanism [13]. Ofloxacin encounters anaerobic bacteria, chlamydiae, and some related organisms, such as mycoplasmas or mycobacteria [14] (Figures 2-4).

## Methodology

UV-1800 Shimadzu double beam spectrophotometer was used for the measurement of the spectra. The solvent used was distilled water.

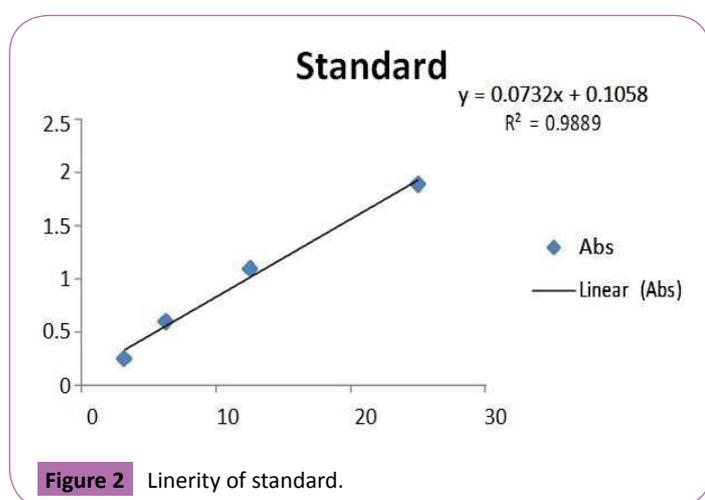


Figure 2 Linearity of standard.

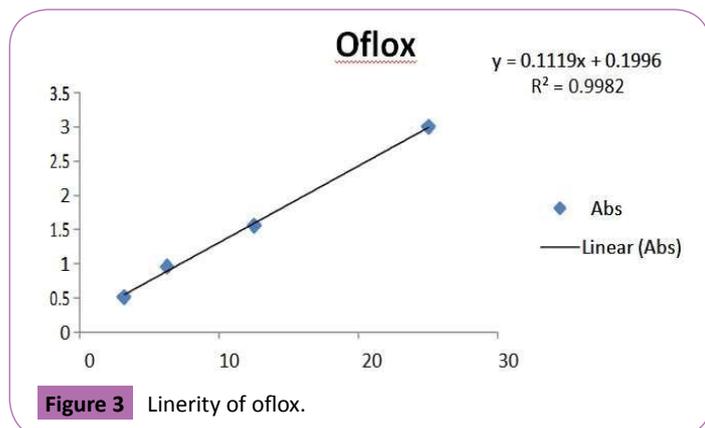


Figure 3 Linearity of oflox.

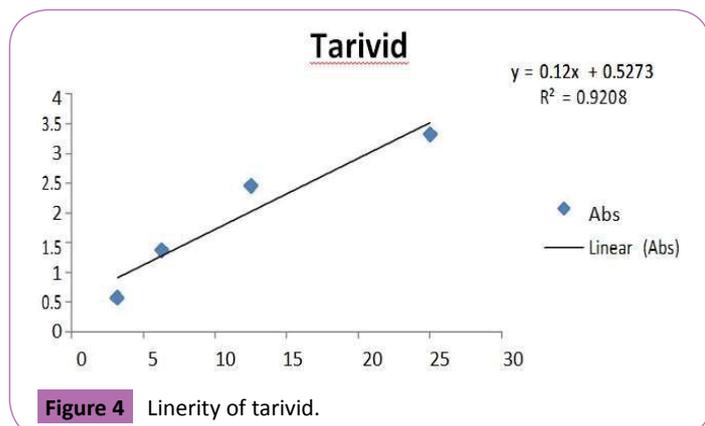


Figure 4 Linearity of tarivid.

## Preparation of Stock Solution:

100ppm stock solution was prepared in the distilled water for active and each of the two brands. 10mg of active was taken in a 100mL volumetric flask. Add sufficient water to dissolve the drug and make up the volume with same solvent to produce 100ppm solution. 100 ppm solution for each brand had been prepared by dissolving the ground tablets in a quantity calculated using theoretical weight and label claim in a 100mL volumetric flask. Add sufficient water to dissolve the drug and make up the volume with same solvent to produce 100ppm solution.

## Selection of Wavelength

The 100ppm stock solution scanned between the UV ranges of 190-400nm. The wavelength corresponding to maximum absorbance of the drug was found at 294nm.

## Procedure

Standard and tablets of each brand were used to prepare the 3 stock solutions of 100 ppm each. From this stock solution further dilutions were prepared having concentration of 25ppm, 12.5ppm, 6.25ppm and 3.125ppm. All these dilutions were scanned at UV-Vis spectrophotometer at 294nm using distilled water as blank. Calculate the regression by using regression equation.

## Result and Discussion

An easy and cost effective analytical method of ofloxacin was developed by using active and 2 different brands of tablets (Oflox manufactured by Indus Pharma Batch # 1008 and Tarivid manufactured by Sanofi Aventis Batch # WD057) on spectrophotometer at 294 nm. The linearity relationship was obtained by preparing solutions of different concentration and regression was calculated. Solutions having concentrations of 25ppm, 12.5ppm, 6.25ppm and 3.125ppm were prepared and the absorbance was found to be directly proportional to the concentration. The result and linear trend line shows that absorbance increases with the increase in concentration. The regression and the correlation coefficient values also found to be within the limit.

## Conclusion

At different concentrations (25ppm, 12.5ppm, 6.25ppm and 3.125 ppm) a straight linear relationship was obtained (Table 1). Absorbance was found to be directly proportional to concentration verifying Beer's Lambert law obtained in the concentration range of 3.125-25 ppm with correlation coefficients 0.988, 0.998, 0.920 for active ofloxacin, Oflox and Tarivid tablets respectively which meet the criteria mentioned in the ICH guide lines. The linear regression equation obtained by least square regression method were  $y = 0.073x + 0.105$  for active,  $y = 0.111x + 0.199$  for Oflox and  $y = 0.12x + 0.527$  for Tarivid which also meet the criteria mentioned in the ICH guide lines, where  $y$  is the absorbance and  $x$  is the concentration of the pure drug solution.

**Table 1** Absorbance regression equation and R<sup>2</sup> of active and brands.

Conc	Standard	Tarivid	Oflox
25	1.895	3.327	3.004
12.5	1.102	2.462	1.562
6.25	0.605	1.372	0.962
3.15	0.254	0.575	0.519
Reg Eq.	$y = 0.073x + 0.105$	$y = 0.12x + 0.527$	$y = 0.111x + 0.199$
R <sup>2</sup>	0.988	0.92	0.998

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