



## Novel Microwell-Based Spectrophotometric Method with High Throughput for Determination of 4-Quinolone Antibiotics in their Pharmaceutical Formulations via Spontaneous Formation of Water Soluble Ion-pair Complexes

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**SUMMARY.** The present study describes the development of novel microwell-based spectrophotometric methods with high throughput for the determination of thirteen pharmaceutically important 4-quinolone antibiotics. The method was based on the spontaneous formation of yellow colored water-soluble ion-pair complexes between each of the studied drugs and  $\beta$ -naphthol reagent in sulphuric acid medium at room temperature. These reactions were carried out in a 96-microwell plate and the absorbance of the colored-product was measured by a microwell plate absorbance reader. The formed ion-pair complexes had maximum absorption peaks in the range of 365-391 nm. The variables affecting the reactions were carefully investigated and the conditions were optimized. Under the optimum conditions, linear relationships with good linear coefficients (0.9978-0.9992) were found between the absorbance and the concentration of the investigated drugs in the range of 30-950  $\mu\text{g/mL}$ . The assay limits of detection and quantitation were 3.1-29.9, and 10.2-98.7  $\mu\text{g/mL}$ , respectively. The precision of the method was satisfactory; the values of relative standard deviations did not exceed 2%. The proposed method was successfully applied to the analysis of the investigated drugs in pure and pharmaceutical dosage forms with good accuracy and precisions; the percentages of label claim ranged from 99.1-102.3  $\pm$  0.76-1.30%. The results obtained by the proposed spectrophotometric method were comparable with those obtained by the official or reported methods. The proposed method is superior to all the previously reported ion-pair formation-based methods, in terms of simplicity and throughput because it did not involve extraction procedures for the ion-pair complex and the procedures were carried out in 96-well assay plate. Therefore, this method is recommended for routine use in quality control laboratories for determination of the investigated 4-quinolone antibiotics in their pure forms and pharmaceutical dosage forms.

**KEY WORDS:** 4-Quinolone antibiotics, Ion-pair complexes,  $\beta$ -Naphthol, Spectrophotometry, Microwell-based methods, High analysis throughput.

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