

# Voltammetric Behavior and Analytical Applications of Lomefloxacin, an Antibacterial Fluorquinolone

ALEJANDRO ÁLVAREZ-LUEJE, CAMILO LÓPEZ, LUIS J. NÚÑEZ-VERGARA, and JUAN A. SQUELLA

University of Chile, Chemical and Pharmaceutical Sciences Faculty, Bioelectrochemistry Laboratory, PO Box 233, Santiago 1, Chile

Lomefloxacin was reduced on a dropping mercury electrode, producing one or more peaks, depending on the pH of the aqueous medium. Coulometric measurements gave an experimental value of 1 electron for the main peak. Electrolysis was followed by UV spectrophotometry and liquid chromatography (LC), showing that a new band at 413 nm appeared for the electrolysis product in an acidic medium. Furthermore, by using UV spectrophotometry, an apparent pKa value of  $6.75 \pm 0.05$  was obtained for lomefloxacin corresponding to the carboxyl moiety in the 3-position. For analytical studies, the differential pulse polarographic mode in 0.1N HCl was selected. The repeatability and reproducibility of the method were adequate (coefficient of variation [CV], 0.51%). The calibration curve method was used for the lomefloxacin concentration range of  $7.0 \times 10^{-6}$  to  $7.0 \times 10^{-5}$  M. The detection and quantitation limits were  $1.0 \times 10^{-6}$  and  $6.9 \times 10^{-6}$  M, respectively. For purposes of comparison, both UV spectrophotometric and LC (with UV and fluorimetric detection) methods were developed. The polarographic method showed good selectivity with respect to both excipients and degradation products. The recovery study showed a CV of <2% and an average recovery of 99.5% and it was not necessary to treat the sample before analysis. The method was applied to the determination of the uniformity content of lomefloxacin commercial tablets. The polarographic method was also successfully applied to the quantitation of lomefloxacin in urine, and the renal excretion profile was also determined.

Lomefloxacin, 1-ethyl-6,8-difluoro-1,4-dihydro-7-(methyl-1-piperazinyl)-4-oxoquinoline-3-carboxylic acid (Figure 1), is a synthetic fluorquinolone derivative, orally active, with a broad spectrum against resistant mutant bacteria (1–3). The attachment of a fluorine atom at C-6 and a piperazine or methyl piperazine group at C-7 has led to more active agents such

norfloxacin, ciprofloxacin, ofloxacin, and lomefloxacin, compared with the classical quinolone derivatives (1, 4).

Lomefloxacin is rapidly absorbed after oral administration of a 400 mg single dose, with a mean plasma maximum concentration of about 4.48  $\mu\text{g/mL}$  (1, 5, 6). The drug is minimally metabolized, with the corresponding glucuronide derivative being the most important metabolite, which is found in urine in amounts representing about 9% of the administered dose. The other 4 metabolites together account for minor amounts of 0.5% of the administered dose (1, 7). Approximately 65% of the administered dose is excreted in the urine as the unchanged drug in patients with normal renal function (1, 8). The mean urine concentration exceeds 35  $\mu\text{g/mL}$  for at least 24 h after dosing (1).

Several methods for the determination of lomefloxacin both in biological fluids and in dosage forms have been reported. The techniques used in such studies include liquid chromatography (LC; 9–15), spectrophotometry (16–18), and microbiological assays (19, 20). To the best of our knowledge, the drug has not been studied by electrochemical methods. Only the polarographic behavior and the pharmaceutical assay of some analogue derivatives such as enoxacin (21), norfloxacin (22), and ofloxacin (23–25) have been reported. Lomefloxacin is not included in any pharmacopoeia.

This paper describes the voltammetric behavior of lomefloxacin, examined by means of differential pulse polarography (DPP), fast polarography, and cyclic voltammetry, and the development of an electroanalytical method for the determination of lomefloxacin in pharmaceuticals and in biological fluids such as urine.

## METHOD

### Reagents and Drugs

(a) *Lomefloxacin hydrochloride*.—100% chromatographically pure. Obtained from Dr. Reddy's Laboratories Ltd. (Andhra Pradesh, India).

(b) *Maxaquin tablets*.—Amount declared, 400.0 mg lomefloxacin hydrochloride/tablet. Obtained commercially (Grunenthal Laboratory, Santiago, Chile).

All reagents used were analytical grade.

### Buffer Solution

For LC the solutions under study were buffered by using a 0.05M phosphate buffer solution (disodium hydrogen phos-

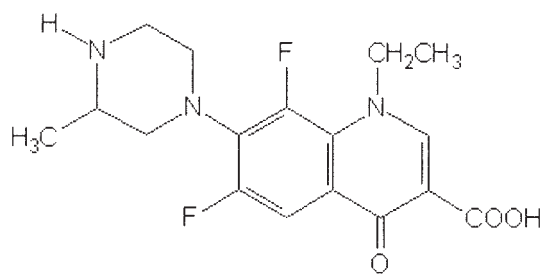


Figure 1. Chemical structure of lomefloxacin.

phate, anhydrous salt), adjusted to  $\text{pH } 3.00 \pm 0.01$  with phosphoric acid. For spectrophotometric and voltammetric techniques, 0.04M Britton-Robinson buffers (acetic acid/boric acid/phosphoric acid), adjusted to an ionic strength of 0.1M with KCl were used.

#### Apparatus

(a) *Polarography.*—A 25 mL thermostated Metrohm measuring cell, with a dropping mercury electrode (DME) as the working electrode, a platinum wire counter electrode, and an Ag/AgCl 3M KCl, Metrohm-type reference electrode (sat-

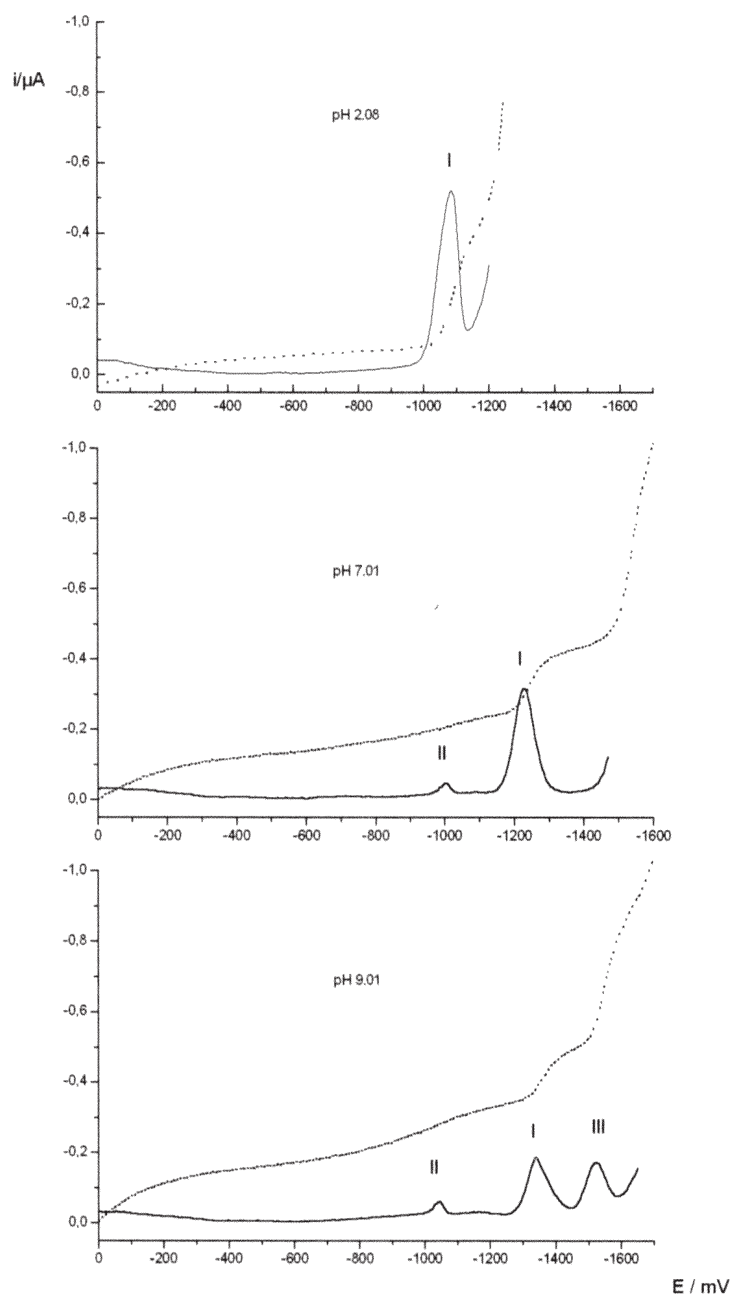
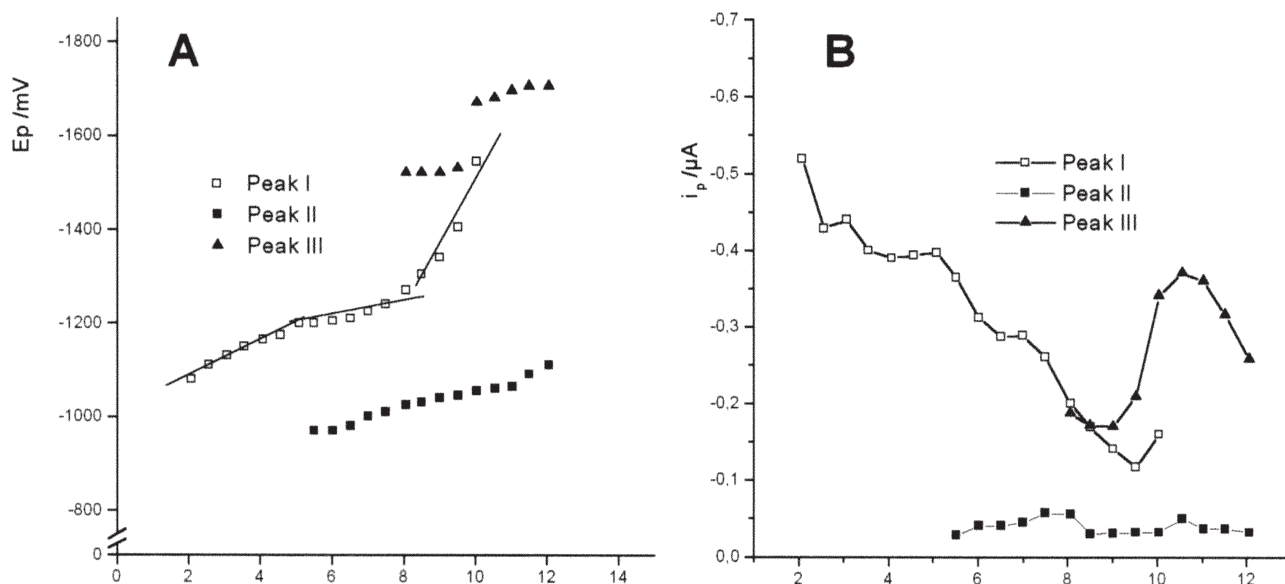


Figure 2. Polarograms of  $1 \times 10^{-4}$  M lomefloxacin in Britton-Robinson buffer at different pH values (solid line: DPP; dashed line: tast polarography).



**Figure 3.** (A) Plot of peak potential versus pH; (B) plot of peak current versus pH ( $1 \times 10^{-4}$  M lomefloxacin in Britton-Robinson buffer).

urated calomel electrode) were used. The operating conditions were as follows: sensitivity, 5–10  $\mu$ A; drop time, 1 s; potential range, –800 to –1200 mV;  $\Delta E_p$ , –5 mV; pulse retard, 40 ms; and pulse height, –50 mV.

(b) *Spectrophotometer.*—Spectrophotometric measurements were made with a UV–Vis spectrophotometer ATI Unicam Model UV3, with a 1 cm quartz cell and equipped with a 486 computer with a Vision acquisition and treatment program.

(c) *Cyclic voltammetry.*—Experiments were performed with a totally automated Inelecsa assembly, similar to one previously described (21).

(d) *Coulometry.*—Totally automated Bioanalytical System CV–50W assembly, consisting of a 10 mL electrolysis cell, a mercury pool as a working electrode, an Ag/AgCl 3M KCl reference electrode, and a Pt auxiliary electrode.

(e) *LC.*—Waters assembly equipped with a Model 600 controller pump and a Model 996 photodiode array detector. Millennium version 2.1 software was used for the acquisition and treatment of data. A Bondapak/Porasil  $C_{18}$  chromatographic column, 150  $\times$  3.9 mm id, and a  $C_{18}$  Bondapak (30  $\times$  4.6 mm id) guard column were used. The injector was a 20  $\mu$ L Rheodyne valve.

#### Irradiation Sources

For UV irradiation, a UV Black-Ray longwave ultraviolet lamp, UVP Model B 100 AP (50 Hz, 2.0 A), with a 100 W Par 38 mercury lamp equipped with a 366 nm filter, was used.

#### Preparation of Solutions

(a) *Stock solution.*—Prepare solution of lomefloxacin at a concentration of  $1 \times 10^{-2}$  M in distilled water.

(b) *Working solution.*—Dilute an aliquot of stock solution with 0.1M HCl to obtain a final lomefloxacin concentration of  $1 \times 10^{-4}$  M.

(c) *Calibration solutions.*—Prepare a series of 10 solutions with lomefloxacin concentrations ranging from  $7.0 \times 10^{-6}$  to  $7.0 \times 10^{-5}$  M in 0.1M HCl (for UV and DPP) or in acetonitrile–0.05M phosphate buffer, pH 3 (15 + 85; for LC).

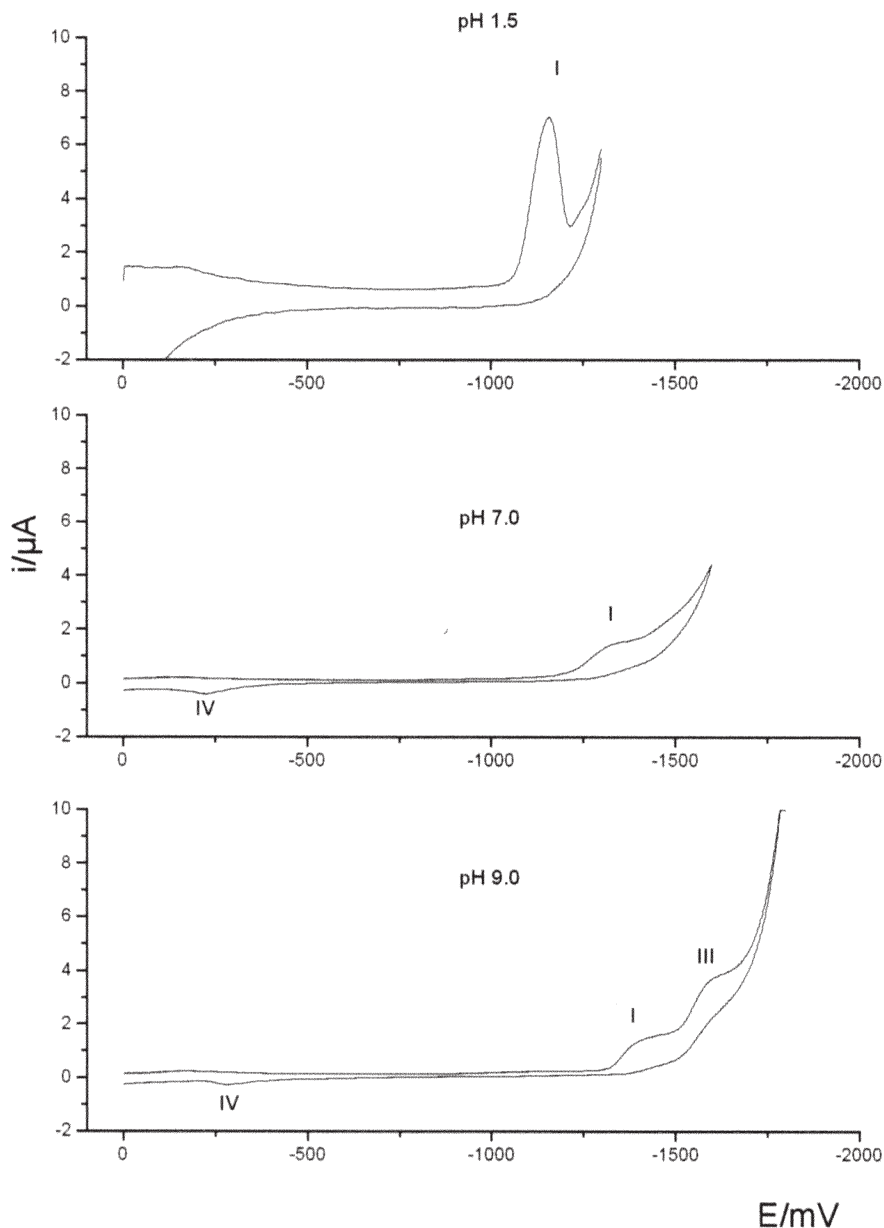
#### Preparation of Synthetic Samples

Add excipients (cornstarch, magnesium stearate, lactose, sodium lauryl sulfate, polyethylene glycol 6000, titanium dioxide, carboxymethyl cellulose, hydroxypropylmethyl cellulose, microcrystalline cellulose, and talc) to the drug for recovery studies, according to manufacturer's batch formulas for 400.0 mg lomefloxacin hydrochloride/tablet. Follow the same procedure for simulated tablets and commercial tablets as described below.

#### Tablets Assay Procedure

*Polarography.*—Suspend each of a series of 10 Maxaquin tablets (amount declared, 400.0 mg lomefloxacin hydrochloride/tablet) in distilled water, sonicate, and dilute to 100 mL. Take a 5 mL aliquot of each solution, and dilute each aliquot to 50 mL with 0.1M HCl solution; then take a 1 mL aliquot of each new solution, and dilute each aliquot to 25 mL with 0.1M HCl. Transfer each sample solution to a polarographic cell, degas with nitrogen during 5 min, and record at least twice from –800 to –1200 mV. Calculate the concentration of lomefloxacin hydrochloride in the sample solution from the prepared standard calibration curve.

*Spectrophotometry.*—Follow the same general procedure as described above to obtain 100 mL aqueous solution. Take a

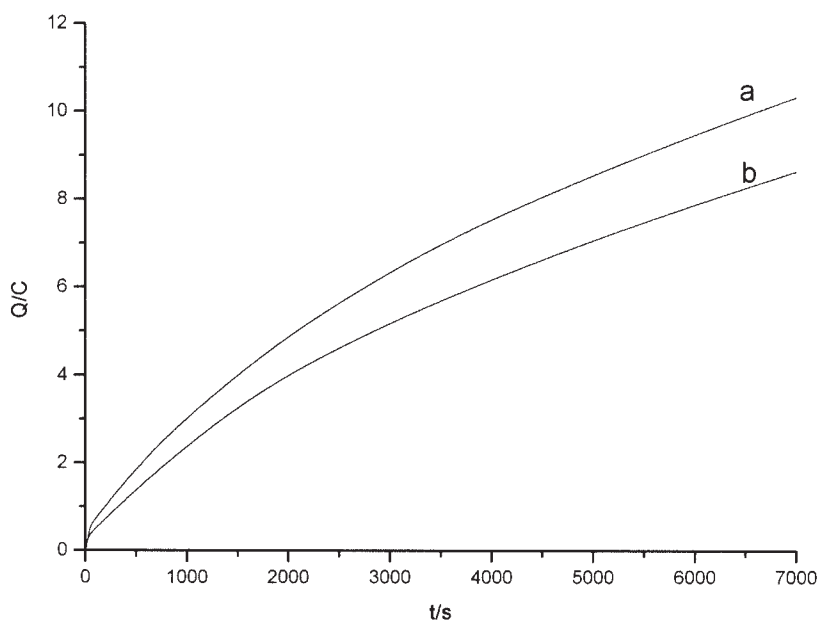


**Figure 4.** Cyclic voltammograms of  $1 \times 10^{-4}$  M lomefloxacin in Britton-Robinson buffer at different pH values.

2 mL aliquot of each solution, and dilute each aliquot to 25 mL with 0.1M HCl solution; then take a 1 mL aliquot of each new solution, and dilute each aliquot to 25 mL with 0.1M HCl. Centrifuge each solution for 10 min at 4000 rpm. Measure the absorbance of the supernatant at 288 nm, and calculate the concentration of lomefloxacin in the sample solution from the prepared standard calibration curve.

*Liquid chromatography.*—Follow the same general procedure as described above to obtain 100 mL aqueous solution. Take a 1 mL aliquot of each solution, and dilute each aliquot

to 10 mL with acetonitrile–0.05M phosphate buffer, pH 3 (15 + 85); then take a 0.8 mL aliquot of each new solution, and dilute each aliquot to 10 mL with acetonitrile–0.05M phosphate buffer, pH 3 (15 + 85). Inject a 20  $\mu$ L aliquot of this solution into the chromatographic system. Operate the photodiode array detector at 288 nm for quantitation. Maintain the flow of the mobile phase, acetonitrile–0.05M phosphate buffer, pH 3.0 (15 + 85), at 2 mL/min, and sparge with helium (30 mL/min) to remove dissolved gases. Keep the temperature constant at 35°C.



**Figure 5.** Course of controlled potential electrolysis (charge vs time) at different lomefloxacin concentrations in 0.04M Britton-Robinson buffer solution, pH 3 ( $E = -1080$  mV);  $a = 1.5 \times 10^{-5}$  mole;  $b = 2.4 \times 10^{-5}$  mole.

#### *Apparent $pK_a$ Determination ( $pK_a$ ; 26)*

For this purpose, use the 328 nm UV band. Change the pH of the solution every 0.5 units, and near the  $pK_a$  zone vary it every 0.25 pH units. Keep the temperature constant at 25°C, and use a  $3 \times 10^{-5}$ M lomefloxacin concentration for the entire pH range.

#### *Coulometric Studies*

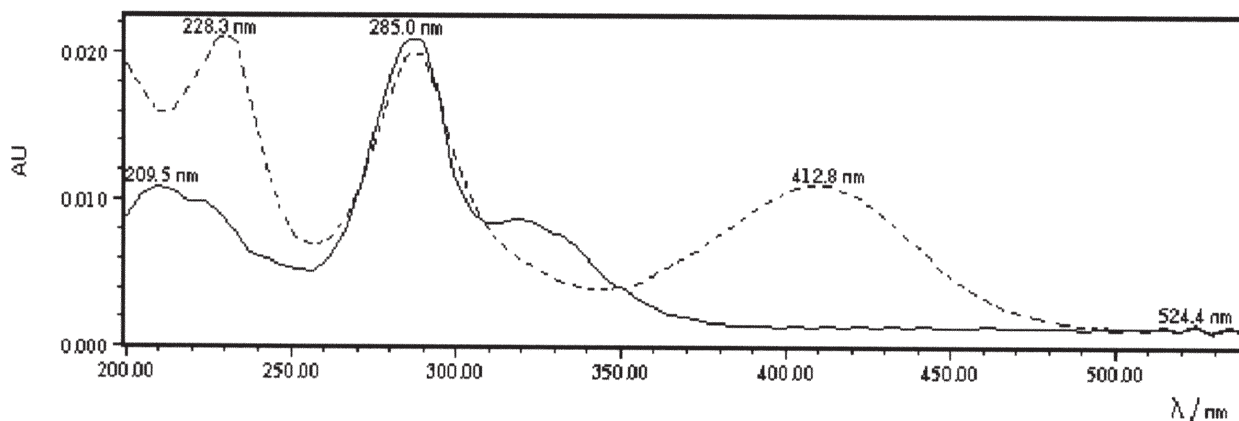
Use quantities of lomefloxacin ranging from 3.6 to 10.6 mg dissolved in 10 mL 0.04M Britton-Robinson buffer, pH 3, and adjust the ionic strength to 0.1M with KCl.

#### *Selectivity Studies (27)*

The selectivity of the various techniques was evaluated in the presence of excipients and possible degradation products.

*Hydrolysis.*—Transfer to a 10 mL distillation flask and boil for 1 h at reflux 3 different solutions of  $1 \times 10^{-3}$ M lomefloxacin in the following: (1) water for neutral hydrolysis, (2) 1M HCl for acid hydrolysis, and (3) 1M NaOH for basic hydrolysis. Then keep the solution at  $-20^\circ\text{C}$  and protected from light.

*Chemical oxidation.*—Transfer to a 10 mL distillation flask and boil for 1 h at reflux a  $1 \times 10^{-3}$ M lomefloxacin solution containing 1%  $\text{H}_2\text{O}_2$ . Then keep the solution at  $-20^\circ\text{C}$  and protected from light.



**Figure 6.** Spectra of lomefloxacin solution (solid line) and its electrolyzed derivative (dashed line) in acidic media.

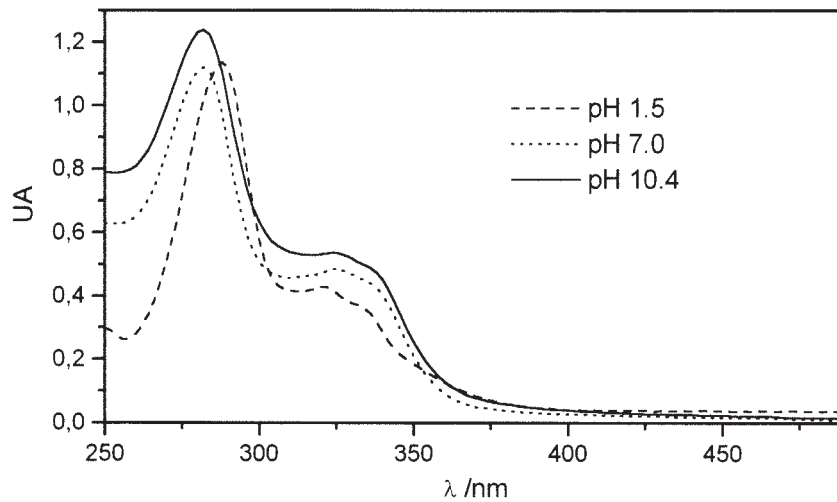


Figure 7. Spectra of  $3 \times 10^{-5}$  M lomefloxacin in Britton-Robinson buffer at different pH values.

*Photolysis in solution.*—Bubble nitrogen through 10 mL  $1 \times 10^{-3}$  M lomefloxacin aqueous solution for 2 min, transfer solution to a black box, and irradiate solution with UV light at a distance of 15 cm for 20 min. Then keep the solution at  $-20^{\circ}\text{C}$  and protected from light.

*Thermolysis.*—Heat 3.8 mg lomefloxacin hydrochloride at  $105^{\circ}\text{C}$  for 5 h, dissolve in water, and keep the resulting solution at  $-20^{\circ}\text{C}$  and protected from light. Then dilute the solution with 0.1M HCl to obtain an assay solution with a lomefloxacin concentration of about  $1 \times 10^{-4}$  M.

Assay each solution obtained from the degradation trials by DPP, UV, and LC techniques. Perform all the degradation trials in duplicate.

#### Determination of Lomefloxacin in Urine

*Preparation of the calibration solutions.*—Prepare a series of 10 solutions with lomefloxacin concentrations ranging from  $4 \times 10^{-6}$  to  $2 \times 10^{-5}$  M, by diluting appropriate volumes of stock solution. Add 1 mL urine to each solution, and dilute to 25 mL with 0.1M HCl.

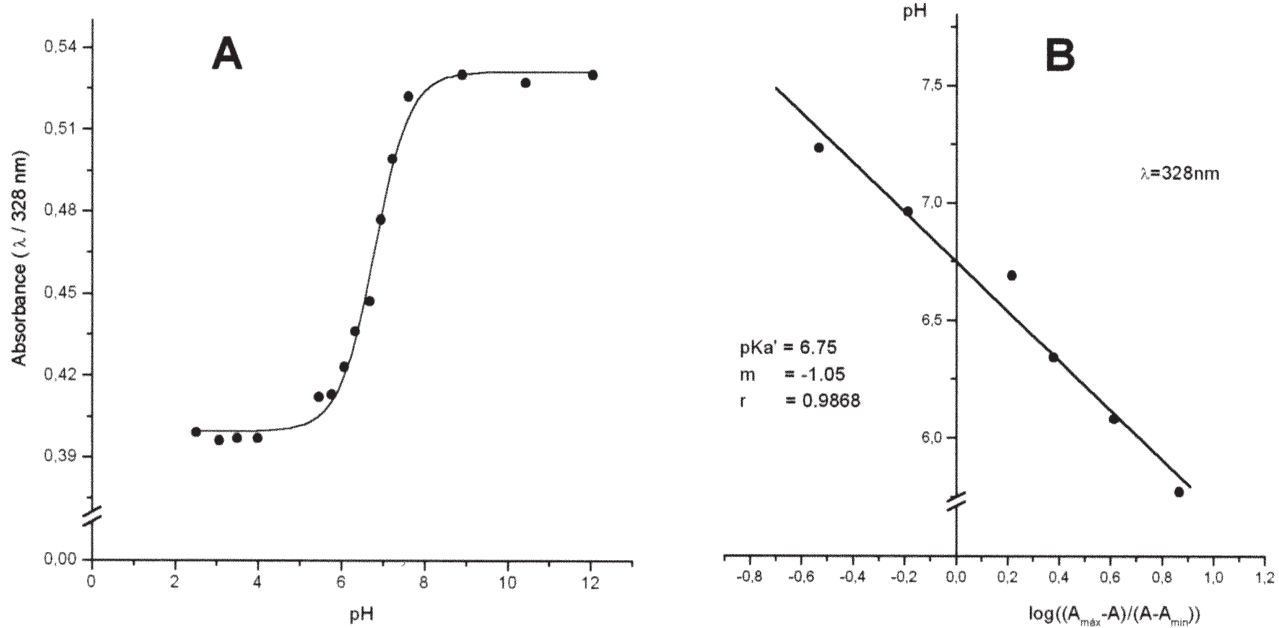
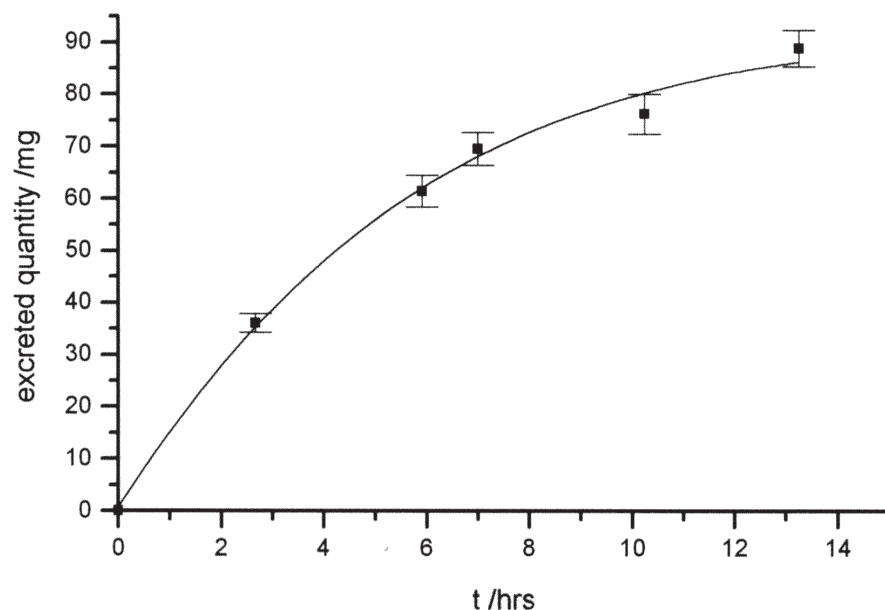


Figure 8. (A) Plot of absorbance versus pH. (B) Plot for determination of pKa.



**Figure 9.** Renal excretion profile of lomefloxacin, determined by DPP, after a single 400 mg oral dose.

*Determination in urine.*—Administer 1 tablet containing 400 mg lomefloxacin to a healthy volunteer. Collect urine from this volunteer every 3 h for up to 13 h, approximately. Measure and record the total volume of urine collected. Dilute a 1 mL aliquot of the urine to 25 mL with 0.1M HCl solution. Transfer the solution to a polarographic cell, degas with nitrogen for 10 min, and record between  $-800$  and  $-1200$  mV. Measure the peak potential at  $-1010$  mV, and obtain the lomefloxacin concentration in the urine from the calibration curve.

*Statistical Analysis*

The different techniques, as well as the standard deviations, were compared by means of the Student’s *t*-test with confidence limits of 95 and 99% (28, 29).

**Results and Discussion**

*Cathodic Characterization*

The reduction of lomefloxacin in aqueous solutions at the DME produces peak or waves, depending on the

**Table 1.** Recovery (%) of lomefloxacin from synthetic samples<sup>a</sup> by 3 different methods

Parameter	DPP	UV-Vis spectrophotometry (288 nm)	LC	
			UV detection	Fluorimetric detection
	98.7	105.1	100.5	99.6
	99.9	111.6	99.4	99.7
	96.8	106.3	96.9	97.1
	98.3	112.2	99.3	99.1
	100.6	108.8	100.8	100.3
	97.5	111.2	97.6	97.8
	102.7	111.9	101.4	100.7
	99.7	111.0	99.2	99.3
	100.5	111.4	101.2	100.9
	99.9	107.0	100.1	100.3
Avg. rec.	99.5	109.6	99.6	99.5
SD	1.7	2.6	1.5	1.2
CV, %	1.7	2.4	1.5	1.2

<sup>a</sup> Each sample for recovery was prepared with lomefloxacin and excipients in proportions according to the batch formulations.



**Table 2. Results (mg/tablet) obtained by 3 different methods for the uniformity content determination of lomefloxacin in commercial tablets<sup>a</sup>**

Parameter	DPP	UV-Vis spectrophotometry	LC	
			UV detection	Fluorimetric detection
	390.8	397.8	391.5	392.5
	394.6	396.0	396.2	395.7
	359.1	363.4	360.0	370.2
	403.0	408.6	402.5	398.2
	342.1	362.0	344.7	349.2
	351.7	358.9	351.0	350.1
	390.8	402.0	391.3	390.7
	369.1	360.7	369.4	368.1
	380.3	392.3	381.6	380.4
	398.8	401.1	398.1	397.9
Avg. rec.	378.0	384.3	378.6	379.3
SD	21.3	20.3	20.9	19.0
CV, %	5.6	5.3	5.5	5.0

<sup>a</sup> Each tablet of Maxaquin had a declared amount of 400.0 mg lomefloxacin plus excipients.

polarographic mode used (Figure 2). With DPP lomefloxacin produces a main peak between pH 2 and 10 (peak I), which shifts cathodically with the increase in pH. In addition, in the alkaline range 2 new signals appear (peaks II and III).

Figure 3 shows plots of both peak potential and peak current versus pH. The plot of  $E_p$  versus pH shows that peak I is strongly pH dependent, with breaks at pH 5 and 8 (for pH range 2–5, slope =  $-37.4$  mV/pH; for pH range 5–8, slope =  $-20.1$  mV/pH; for pH range 8–10, slope =  $-91.0$  mV/pH), which are probably related to the apparent  $pK_a$  of the molecule, i.e., the carboxyl moiety and piperazine nitrogen, respectively. The 3 zones in the  $E_p$  versus pH plot can be attributed to different species that reach the surface of the electrode: in the pH 2–5 range, the carboxyl moiety and the protonated piperazine nitrogen; in the pH 5–9 range, the zwitterionic species; and at pH >9, the carboxylate moiety and no protonated N-4 piperazine moieties. With the tast mode an analogous behavior with pH was observed (data not shown).

With cyclic voltammetry the main peak (I) corresponds to an irreversible reaction over the entire pH range; in addition, an anodic peak appears at approximately  $-200$  mV (peak IV in Figure 4). In an alkaline medium (pH >9), one new irreversible cathodic peak is produced (peak III). This peak is not produced by the DPP or tast mode.

Furthermore, the cathodic peaks shift negatively with an increase in the sweep rate, and a plot of  $\log I_{p_c}$  versus  $\log V$  gave a linear relationship with a slope of 0.5, suggesting that the reaction at the electrode was diffusion controlled.

The cyclic voltammetry experiments at different sweep amplitudes show that the anodic peak (IV) depends on the reduction produced at a more cathodic potential (peaks I and

III); this means that the anodic peak is due to a secondary oxidation product of this previous reaction at the electrode.

#### Coulometry

Figure 5 shows a plot of current versus electrolysis time at  $-1080$  mV for 2 different concentrations of lomefloxacin in 0.04M Britton-Robinson buffer solution, pH 3. From these experiments, it was possible to calculate the number of electrons involved in the reaction at the electrode; surprisingly, it was found to be  $1.0 \pm 0.2$ . This value differs from those previously reported for other quinolone related-compounds, such as norfloxacin, nalidixic acid, ciprofloxacin, or ofloxacin (22–25). However, in all of these previous reports the number of electrons was not experimentally calculated directly by coulometric measurement.

Furthermore, from the electrolysis experiments it was possible to observe that the solution became yellow, presumably because of the formation of a more highly conjugated compound. This yellow solution was very unstable under normal laboratory conditions of light and temperature and turned brown in a few minutes. The course of electrolysis was followed by UV-Vis spectrophotometry, as shown in Figure 6. The spectrum shows a new band at 413 nm, which is consistent with the appearance of the yellow color. Considering that dimer formation is the most probable explanation for the enhanced conjugation, the dimeric derivative of lomefloxacin could be the electrolysis product. An analogous dimeric derivative was proposed as the photolytic derivative of a related quinolone compound, ciprofloxacin (30).

After electrolysis was completed, the electrolyzed solution was injected into the LC system followed by the photodiode array detector. From the liquid chromatogram, we obtained



only one signal for the electrolyzed sample and a retention time of 1.7 min, compared with 5.6 min obtained for the lomefloxacin standard. Additionally, at the end of the electrolysis, a differential pulse polarogram of the electrolyzed solution was recorded, showing that the peak corresponding to lomefloxacin was gone and that other peaks were not present. This experimental evidence means that the electrolysis totally consumed the lomefloxacin and that the electrolysis product was not reduced at the electrode. Furthermore, the short retention time obtained (1.7 min) implies a strong increase in polarity when compared with that of lomefloxacin, under the LC experimental conditions. This decrease in retention time may be consistent with the proposal of a dimeric derivative containing 2 basic moieties (piperazine rings).

#### UV-Vis Spectrophotometry

Figure 7 shows the spectra of  $3 \times 10^{-5}$  M lomefloxacin solutions at different pH values. It can be observed that at 328 nm a hyperchromic effect is produced as the pH increases. This behavior was used to calculate the apparent pKa of lomefloxacin (Figure 8). We found a pKa' value of  $6.75 \pm 0.05$ , in accordance with the first break in the  $E_p$  versus pH plot. This pKa value corresponds to the dissociation of the carboxyl moiety at the 3-position. This high pKa' value for a carboxyl moiety can be explained by the influences of the carbon double bond between the 2-position and the 3-position and the carbonyl group at the 4-position. This carbonyl group forms an intramolecular hydrogen bridge with the adjacent carboxyl group, diminishing the acidity of the latter group.

#### Analytical Applications

For analytical studies, the DPP mode in a medium of 0.1N HCl was selected. The repeatability and reproducibility (change of operator, day, and equipment) of the method were adequate, showing a coefficient of variation (CV) of 0.51% ( $n = 10$ ). For quantitation, the calibration curve method was used. The regression line was described by the following equation:

$$ip(\mu A) = 0.0167 - 8308.1 \times C(M) \quad (r = 0.9996, n = 10)$$

for a lomefloxacin concentration range of  $7.0 \times 10^{-6}$  to  $7.0 \times 10^{-5}$  M. The detection and quantitation limits found were  $1.0 \times 10^{-6}$  and  $6.9 \times 10^{-6}$  M, respectively.

For purposes of comparison, both UV spectrophotometric and LC (with UV and fluorimetric detection) methods were developed. The regression curves were described by the following equations:

UV spectrophotometry,  $\lambda = 288$  nm:

$$AU = 0.01218 + 32137.12 \times C(M) \quad (r = 0.9996, n = 10)$$

LC with UV detection,  $\lambda = 288$  nm:

$$AUC = -71113.9 + 2.64 \times 10^{10} \times C(M) \quad (r = 0.995, n = 10)$$

LC with fluorimetric detection,  $\lambda_{EX} = 288$  nm,

$\lambda_{EM} = 430$  nm:

$$AUC = -19869.2 + 1.888 \times 10^{10} \times C(M) \\ (r = 0.998, n = 10)$$

#### Selectivity Studies

*Selectivity in the presence of excipients (31).*—The polarographic peak of lomefloxacin was unaltered when the following excipients were tested: cornstarch, magnesium stearate, lactose, sodium lauryl sulfate, titanium dioxide, carboxymethyl cellulose, hydroxypropylmethyl cellulose, polyethylene glycol 6000, microcrystalline cellulose, and talc.

*Selectivity in the presence of possible degradation products.*—When lomefloxacin was hydrolyzed (acid, neutral, or basic hydrolysis), the peak potential of the drug remained unaltered at approximately  $-1050$  mV, and in all cases the peak current decreased by approximately 50%. When lomefloxacin solutions were submitted to the photolysis test for 15 min, a 90% decline in peak current, without any new signals, was obtained. The thermolysis test did not show changes in the lomefloxacin peak potential. The oxidation test produced a breakdown of the molecule with the subsequent loss of the polarographic signal.

In Table 1 the results of the recovery study for the 3 different methods are shown. As can be seen, the LC and DPP results are adequately precise and accurate ( $99.5 \pm 1.5$  and  $99.5 \pm 1.7$ , respectively), and both methods are recommended for the determination of lomefloxacin in tablets. However, the comparable spectrophotometric results are not as precise ( $109.6 \pm 2.6$ ), and consequently that method is not recommended for tablet analysis, because of the obvious influence of the excipients in the quantitative assay. With DPP, both the average recovery and the CV are similar to those obtained by LC, but the DPP method needs no treatment of the sample before analysis.

Lomefloxacin in tablets was determined by means of the individual tablet assay test, a procedure that allows evaluation of the homogeneity and distribution of the active substance at different points in the batch. The results of the individual tablet assay are shown in Table 2. According to the general criteria stated in the *United States Pharmacopeia* (32), the formulation has an adequate uniformity content of tablets and exhibits an adequate distribution of the drug per tablet.

From the statistical analysis of the results for each applied method, it was concluded that there were no significant differences among the methods and that they were statistically equivalent; the results were compared in the uniformity content test by applying  $F$  of the Snedecor test (variance proportion) and then the Student's  $t$ -test ( $P < 0.05$ ,  $n = 10$ ).

The developed polarographic method was successfully applied to the determination of lomefloxacin in the urine of a healthy volunteer. For this purpose, the calibration curve method was used. The calibration curve was described by the following regression equation:

$$ip(\mu A) = -0.4207 - 12075 \times C(M)$$

(for 10 points ranging from  $4.0 \times 10^{-6}$  to  $2.0 \times 10^{-5}$  M,  $r = 0.998$ ).

Lomefloxacin is known to be minimally metabolized; approximately 65% of the administered dose is excreted in urine as the unchanged drug in patients with normal renal function, and the mean urine concentration has been reported to exceed 35 µg/mL for at least 24 h after dosing (1, 5, 8).

Figure 9 shows the excretion profile of lomefloxacin, expressed as cumulative quantities excreted in the uring after an oral dose of 400 mg.

The repeatability and reproducibility of the method were adequate, with CV values of 0.61 and 1.10%, respectively. The results of the recovery study showed an average recovery of 99.6% with a CV of 1.10% (urine spiked samples).

The DPP developed method is an adequate tool for the determination of lomefloxacin in both pharmaceuticals and urine. Pre-treatment of the sample is not required, the method is not time consuming, and the accuracy and reproducibility of the method are adequate.

### Acknowledgments

We are very grateful for the support of Fondo de Desarrollo Científico y Tecnológico Grant No. 1000853 and of Departamento de Investigación y Desarrollo, University of Chile.

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