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ORIGINAL ARTICLE

Determination of clemastine hydrogen fumarate, desloratadine, losartan potassium and moxepril HCl through binary complex formation with eosin

Soad S. Abd El-Hay *, Magda Y. El-Mammli, Abdalla A. Shalaby

Department of Analytical Chemistry, Faculty of Pharmacy, Zagazig University, Zagazig 44519, Egypt

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Abstract A simple and sensitive spectrophotometric method has been established for the determination of clemastine hydrogen fumarate (I), desloratadine (II), losartan potassium(III) and moxepril HCl(IV) based on binary complex formation with eosin. The method does not involve solvent extraction through the use of a non-ionic surfactant (methylcellulose). The color of the produced complex was measured at 552, 549 nm for (I), (II) while was measured at 540 nm for (III) and (IV). Appropriate conditions were established for the color reaction between eosin and the studied drugs to obtain maximum sensitivity. Under the proposed conditions, the method is applicable over concentration range of 1.25–11.25, 0.31–2.81, 2.5–20 and 1.25–15 μg/ml for (I), (II), (III) and (IV), respectively. The molar absorptivity (ε), sandell sensitivity, detection (LOD) and quantitation limits (LOQ) are calculated. Unlike other reported ion-pair techniques, the suggested methods have the advantage of being applicable for the determination of the four drugs in their pharmaceutical dosage forms without prior extraction with excellent recoveries.

* Corresponding author. Address: Department of Analytical Chemistry, Faculty of Pharmacy, Zagazig University, Egypt. Tel.: +1 336 782 7922, +20 14 5933066; fax: +20 55 2303266.
E-mail addresses: soadselem@yahoo.co.uk, selems@wfu.edu (S.S. Abd El-Hay).

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1. Introduction

Clemastine (I) used as the hydrogen fumarate in hay fever, rhinitis, allergic skin conditions, and pruritus. It causes drowsiness; few procedures are described for its determination including spectrophotometry (Clementina, 2008; Hassan et al., 2008; El Ragehy et al., 1995), HPLC (Jinlong and Jianguo, 2007; Viola et al., 2005). Desloratadine (II) an orally active major metabolite of the nonsedating antihistamine loratadine is a selective, potent, peripheral H_1 receptor antagonist. Very few visible spectrophotometric methods have been described for its determination (Patel et al., 2004; Nahed et al., 2007). Also, liquid chromatography (El-Sherbiny et al., 2007; Jun et al., 2009) technique has been described.

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Losartan potassium(III) is a highly selective, orally active, non-peptide angiotensin II receptor antagonist indicated for the treatment of hypertension. Determination of Losartan has been carried out by HPLC (Choi et al., 2008; Obando et al., 2008; Budi et al., 2009). However, few spectrophotometric methods have been reported for its analysis (Ibrahim, 2005; Thomas et al., 2007). Moexipril HCl (IV) is a new potent orally active non-sulfhydryl angiotensin-converting enzyme (ACE) inhibitor which is used for the treatment of hypertension and congestive heart failure. Few analytical methods have been developed for the determination of moexipril, including derivative spectrophotometric (Erturk et al., 2003) and spectrophotometric methods (El-Shanwani et al., 2008a). RP-HPLC has been developed for the simultaneous determination of moexipril (El-Shanwani et al., 2008b).

Suitable organic dyes such as eosin were used for determination of many pharmaceutical compounds either spectrophotometry through the formation of binary or ternary complexes (Rahman and Rahman, 2011; Gouda et al., 2008; Walash et al., 2007) or spectrofluorimetry (Ibrahim et al., 2011; Rahman et al., 2009; Rahman and Haque, 2008) or by using both spectrophotometry and spectrofluorimetry (Omar, 2010; Abdellatef, 2007).

Here, for the first time, eosin was applied to react with clemastine hydrogen fumarate (I), desloratadine (II), losartan potassium (III) and moxepril HCl (IV) presenting a rapid and sensitive assay procedure for the studied drugs in pure and in pharmaceutical formulations. The proposed method can be used in laboratories where modern and expensive apparatus, such as that required for GLC or HPLC is not available in most quality control laboratories.

2. Experimental

2.1. Apparatus

Spectrophotometric measurements were carried out using a Shimadzu recording spectrophotometer UV 1800 equipped with 10 mm matched quartz cells.

Digital analyzer pH meter (USA) was set to check pH values of acetate buffer solutions.

2.2. Materials and reagents

Clemastine hydrogen fumarate was kindly supplied by Novartis pharmaceutical company (Cairo, Egypt). Its pharmaceutical preparations Tavegyl® tablets (labeled to contain 1 mg clemastine per tablet) and Tavegyl® ampoules (labeled to contain 2 mg clemastine per 2 mL) were obtained from the local drugstore.

Desloratadine was kindly supplied by Minapharm pharmaceutical company (Cairo, Egypt). Its pharmaceutical preparation Desa® tablets (labeled to contain 5 mg desloratadine per tablet) were obtained from the local drugstore.

Losartan potassium was kindly supplied by Amoun pharmaceutical company (Obor, Egypt). Its pharmaceutical preparation Losar® tablets (labeled to contain 50 mg losartan potassium per tablet) were obtained from the local drugstore.

Moexipril hydrochloride was kindly supplied by Minapharm pharmaceutical company (Cairo, Egypt). Its pharmaceutical preparation Primox® tablets (labeled to contain 15 mg moexipril hydrochloride (IV) per tablet) were obtained from the local drugstore.

Eosin (El-Nasr chemical company, Egypt) was prepared as 0.1%, 0.2% solution in distilled water.

Acetate buffer pH 2.8, 3.7 (British Pharmacopoeia, 2007).

Methylcellulose, 0.3%, 0.5% w/v.

All other chemicals and reagents used were of analytical grade and all solutions were prepared with double distilled water.

2.3. Standard solutions

2.3.1. Preparation of iosartan potassium and moxepril HCl standard solutions

Stock working solutions were prepared to contain 0.5 mg/ml, dissolved in distilled water then the volumes were completed to 50 ml with distilled water in 50 ml volumetric flasks.

Table 1 Characteristic parameters for the reaction of studied drugs with Eosin.[a]

Parameter	Clemastine hydrogen fumarate	Desloratadine	Losartan potassium	Moexipril HCl
λ_{max} (nm)	552	549	540	540
Beers law limits (μg/ml)	1.25–11.25	0.31–2.81	2.5–20	1.25–15
Vol and conc of methyl cellulose	0.5 ml–0.5%	0.5 ml–0.3%	0.5 ml–0.5%	0.5 ml–0.5%
Vol and conc of eosin	1 ml–0.2%	2 ml–0.1%	1 ml–0.1%	1 ml–0.1%
Buffer PH	3.7	2.8	2.8	2.8
Buffer vol	1.5	1	0.2	0.5
Temp. (°C)	25 ± 5	50	60	25 ± 5
Time (min)	5	10	5	10
Regression equation[b]				
Slope (b)	0.0706	0.228	0.035	0.0447
Intercept (a)	0.1574	0.1138	0.1323	0.1105
Correlation coefficient (r^2)	0.9998	0.9999	0.9998	0.9998
LOD (μg/ml)	0.72	0.9	0.82	0.75
LOQ (μg/ml)	2.39	3	2.73	2.51
Sandell sensitivity (μg cm^{-2})	0.01	0.003	0.02	0.014
ε ($\times 10^5$) (L mol^{-1} cm^{-1})	0.53	0.96	0.25	0.36

[a] Average of three experiments.
[b] $A = a + bc$

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