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A comparative study for estimation of Losartan Potassium drug by atomic absorption technique and UV-visible spectrophotometry

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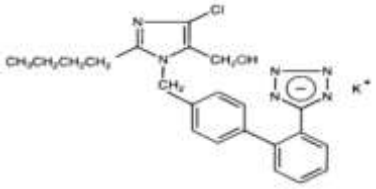
Abstract

Atomic absorption technique is used to determine losartan potassium through the quantitative detection of potassium (K) element in the drug. the extraction was carried out by acid digestion and the percentage recovery is 97.2%, the error percentage is -2.8, detection limit is 0.038 µg /ml, and the relative standard deviation did not exceed 2.58%. The results were compared with UV-Visible technique method with percentage recovery of 96.5%, detection limit is 0.93 µg / ml and the relative standard deviation was not more than 1.55%.

Introduction

Losartan Potassium is a type of angiotensin II [1] receptor antagonists, its molecular formula is (C22H22ClKN6O) and its molecular weight is 461.01 g /mol. a white crystalline powder, dissolves freely in water and methanol and insoluble in chloroform, melting point is 184 °C [2]. The synthetic name and formula are as below [3]



−Butyl−4Chloro−1-[(2−(1htetrazol−5−yl)[11−biphenyl]- 4−yl] methyl]−1h− imidazole−5−methanol potassium.

It is used to treat high blood pressure (Hypertension) [4,5] , where it controls high blood pressure with kidney function protection[6] , and used also in case of heart failure. The overdose of it leads to lower the arterial tension and accelerates heart rate [7,8] . The most common side effects of this medicine are infections of the upper respiratory, dizziness and diarrhea, the most serious side effects are low blood pressure and photosensitivity [9], whereas pregnant women should stop taking the drug once pregnancy is detected because it can cause fetal poisoning, leading to death [10].

Practical Part

A: Apparatus used

The apparatus used are listed in Table (1).

Table (1) The apparatus used

No	The name	Company & origin
1	Atomic absorption spectrometer (AA-6200)	Shimadzu , Japan
2	UV-Visible spectrophotometer (V-530)	Gasco , uk
3	A four-step sensitive balance	Sartorius , Germany

B: Chemicals:

Chemicals used are listed in Table (2)

Table (2) chemicals Used

No	Substance	Chemical formula	Purity%	Company
1	Losartan potassium	$C_{22}H_{22}ClKN_6O$	99.8%	SDI
2	Sulphuric acid	H_2SO_4	97%	Riedel-deHaen
3	Nitric acid	HNO_3	69%	PA
4	Hydrochloric acid	HCl	37%	Riedel-deHaen
5	Chloroform	$CHCl_3$	99.8%	Riedel-deHaen
6	Sodium hydroxide	NaOH	99%	BDH

C: Standard Solutions used

a- Standard solution of Losartan Potassium (1000ppm). Standard Losartan potassium (0.1g) was dissolved in deionized water in a volumetric flask of 100 ml.

b- Sodium hydroxide solution at a concentration of 3.7 molar (3.7g of NaOH was dissolved in deionized water in volumetric flask of 25 ml).

c- HCl Solution of concentration of (1) molar by transferring 2.07 ml of hydrochloric acid (12.063 molar) by a pipette to 25 ml volumetric flask and diluted with distilled water.

D: Analysis by atomic absorption

Extraction method [11]:-

Two tablets of Losartan potassium (100 mg) were taken and crushed well using ceramic mortar, the powder was transferred to a 250 ml flask, 25ml mixture equal volume of 50% H_2SO_4 and 50% HNO_3 were gradually added after that 25ml of 25% H_2SO_4 and 25% HNO_3 were also added. The Reflex process were carryout with heating (90-100) °C for (30-35) minute until the solution became completely clear. The solution was left to cool for 15 minute then filtered and the filtrate was completed to 100 ml with distilled water. The sample was analyzed by atomic absorption to determine the concentration of the element in this sample

E; Analysis by UV-Visible Spectrometry

- Extraction method [12]

Two tablets of Losartan potassium (100 mg) were taken and crushed well using ceramic mortar, the powder was transferred to a beaker of 50 ml and dissolved in 40 ml of distilled water. The solution was made acidic by adding (4-5 drops) of diluted HCl (1M) where the retired pH was (4-5). The solution was then transferred to a separating funnel of 250 ml followed by adding an equal volume of Chloroform (40 ml), and shaking for 10-15 minutes, then the solution was left for a short period and the organic layer is isolated completely.

The aqueous layer was drawn to clean separating funnel of 250 ml followed by adding 5 drops of sodium hydroxide (3.75M) to obtain the retired pH (9-8), then an equal volume of Chloroform (40 ml) were added and shaked for (10-15) minutes and the solution was left for a short period and The organic layer was isolated completely. The organic layers from acidic and basic extractions were filtered and left to dry, and dissolved in deionized water, then analyzed by UV-Visible spectrometer .

Results and discussion

1- Determination by atomic absorption spectrometer

Potassium concentration in the drug was determined using atomic absorption method with operation conditions

Wavelength 766.5nm, Lamp Current10mA, Slit Width 0.7 and air: acetylene flame (8:2).

-Preparation of Calibration Curve.

Different concentrations (0.5-2) µg/ml from a standard Potassium solution in series of 100 ml Volumetric flasks are prepared and their absorption were measured, The relationship between the concentration and absorption are shown in figure (1) .

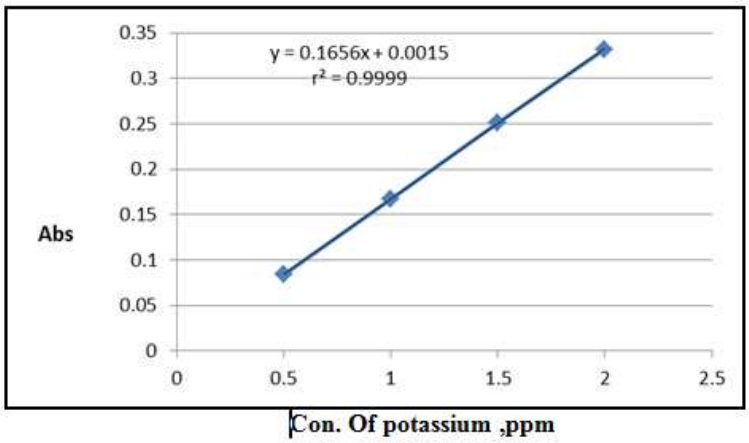


Figure (1) Calibration curve of Losartan Potassium by Atomic Absorption Spectroscopy (AAS)

The results showed a very good linearity in the range of (0.5-2.5) ppm with Correlation efficient (r^2) of 0.9999. The results of the Concentration of potassium in losartan potassium tablet are shown in table (4) with recovery of 97.2%. The relative error (RE%) and relative standard deviation (RSD%) were calculated and the results were presented in table (5). The detection limit is 0.038 ppm (table6). These results indicated that this method is of good accuracy and precision.

Table (4) Results of Determination of Potassium Element in Losartan Potassium tablets Lotion (100 mg) by (AAS) Method

Conc. of K µg /ml		Rec(%)
Present	measured	97.2
84.8	82.43	

Table (5) The accuracy of the method and precision of Potassium by (AAS)

Conc.of losartan potassium µg /ml	RE, %	Recovery, %	Average of Recovery,%	RSD, %
0.5	-2	98	99.2	2.58
1	0	100		4.66
2	-0.4	99.6		0.922

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Table (6) Detection limit of the method

Conc. ppm	X^-	S	D.L. ppm
0.5	0.49	0.0126	0.038

2- Determination by (UV-Visible) Spectroscopy: The maximum wavelength (λmax) of the Losartan Potassium was determined by recording the absorbance in the range of wavelength 200-800nm of the standard drug solution, the results showed that the maximum wavelength was (206) nm Fig.2 .

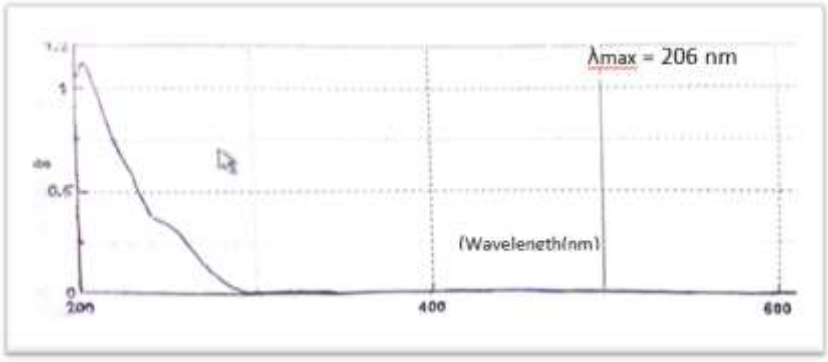

Fig. (2) UV - Visible Absorption Spectrometry for Losartan Potassium

- preparation of Calibration curve

Different concentrations of the drug (20-200) ppm were prepared from stock standard solution and the absorption of each solution was measured, The linearity was in the range (20-100) ppm with correlation efficient (r^2) of 0.9957 as showed in figure (3). The concentration of samples was calculated by straight line equation of calibration curve, the results showed that the recovery was 96-55% as shown in table (7). Relative error RE% and relative standard deviation (RSD%) were calculated as shown in table (8). The detection limit is (0.930) ppm (table 9). These results indicated that this method was of good accuracy and precision.

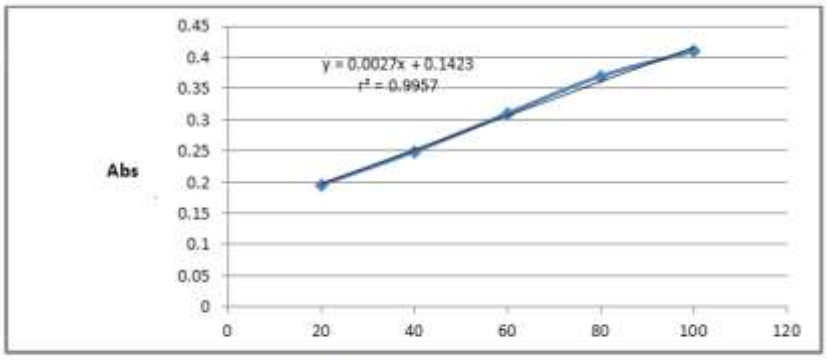

Figure (3) Calibration Curve of Losartan Potassium by (UV-Visible) method

Table (7) Results of Determination of Losartan Potassium (100mg) by (UV-Visible) method

Conc.of Losartan Potassium µg/ml		Rec(%)
present	Measurd	96.55
1000	965.55	

Table (8) The accuracy of the method and precision of Losartan Potassium

Conc. of losartan potassium µg/ml	RE, %	Recovery, %	Average Of Recovery,%	RSD, %
20	-0.7	99.3	100.05	1.55
40	0.02	100.02		1.39
60	0.38	100.38		0.484

Table (9) Detection limit of the method

Conc.ppm	X^-	S	D.L.ppm
20	19.86	0.308	0.930

Conclusions

1- This study showed the possibility of estimating drugs concentration metals by atomic absorption Technique.

2- Determination in inorganic component in the drug formulation to be a function of qualitative diagnosis of the drug using atomic absorption technique.

3- The results of comparing the atomic absorption (ASS) Technique with UV-Visible technique were acceptable for analysis, while the atomic absorption Technique was of higher recovery and lower detection limit.

Reference

[1] Schiffrin. (2002). *E.L. Am. J. Hypertens*, **15**: 115S-122S.
[2] Sumithra, M.; Shanmugasundaram, P. and Sankar, A.N. (2012). Method Development and Validation of losartan potassium by RP- HPLC**.** *Res. J. of Pharma. Biol. and Chem.Sci*., **3 (1):** 463-479.
[3] Gonzalez, L.; Lopez, J.A.; Alonso, R.M. and Jimeneze, R.M. (2002). Fast screening method for the determination of angiotensin II receptors antagonists in human plasma by HPLC with fluorimetric detection. *Journal Chromatogar*, **949 (A):** 49- 60.
[4] Elshanawane, A.A.; Abedelaziz, L.M. and Hafez, H.M. (2012). Stability Indicating HPLCmethod for simultaneous determination of several Angiotensin - II – receptors antagonists in theirdosage forms. *Pharma. Ana. Act*., **3(8):** 1-11.
[5] Setti, N.P.; Sampangi, L.V.; Hegde, R.N. and Nandibewoor, S.T. (2009). Electrochemical oxidation of Loop Diuretic Furosemide at Gold Electrode and its Analytical Applications. *Int. J. Electrochemical*, **(4):** 104-121.
[6] Caruso, D. et al. (2004). *J. Cardiovasc. Pharmacol*, **(44):** 520-524.
[7] http:// www.drugs.com/losartan.html
[8] Mohammed, A.A. and Mahmoud, M.T. (2007). Al-Shamil Book in Clinical Medicine. *Publications of Dar Al-Quds for Science*.
[9]http://www.merck.com/product/usa/pi_circulars/c/cozaar/ cozaar_ppi.
[10] Cozaar (losartan potassium) 25 mg, 50 mg, and 100 mg Tablets. (2015). *fda.gov. Retrieved*.
[11] Uddin, et al. (2016). *Journal of Analytical Science and Technology*, **7(6):** 2-7.
[12] Christian and O- Reilly (1986). Harris (1994). Majors and Fogelman (1993). Wells (2003).

دراسة مقارنة لتقدير عقار لوسرتان بوتاسيوم بواسطة تقنية الامتصاص الذري ومطيافية الاشعة فوق البنفسجية – المرئية

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الملخص

تقنية الامتصاص الذري استخدمت لتقدير دواء لوسرتان بوتاسيوم وذلك من خلال الكشف الكمي لعنصر البوتاسيوم (K) في الدواء. أجري الاستخلاص عن طريق الهضم بالحوامض ونسبة الاسترادادية هي (97.2%)، نسبة الخطأ المئوي (2.8-)، وحد الكشف (0.038 مايكروغرام/مل)، الانحراف القياسي النسبي لاتتجاوز (2.58%). قورنت النتائج مع طريقة الاشعة فوق البنفسجية – المرئية وكانت نسبة الاسترادادية (96.5%)، وحد الكشف (0.93 مايكروغرام/مل)، ونسبة الانحراف القياسي النسبي لاتتجاوز (1.55%).