



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

Walaa Hazim Hameed Aljanabi¹, Sarhan Ali Salman¹, Saleh Abdullah Ahmed²

¹ Department of Chemistry, College of Science, University of Tikrit, Tikrit, Iraq

² College of Pharmacy, University of Tikrit, Tikrit, Iraq

ARTICLE INFO.

Article history:

-Received: 17 / 9 / 2017

-Accepted: 21 / 12 / 2017

-Available online: / / 2018

Keywords: Losartan potassium, Potassium, Atomic absorption spectra.

Corresponding Author:

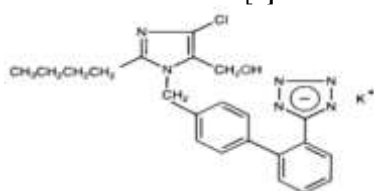
Name: Walaa Hazim Hameed

E-mail:

Tel:

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-(1H-tetrazol-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

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%.

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 ₆ O	99.8%	SDI
2	Sulphuric acid	H ₂ SO 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% H₂SO₄ and 50% HNO₃ were gradually added after that 25ml of 25% H₂SO₄ and 25% HNO₃ 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 shaken 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 Current 10mA, 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) .

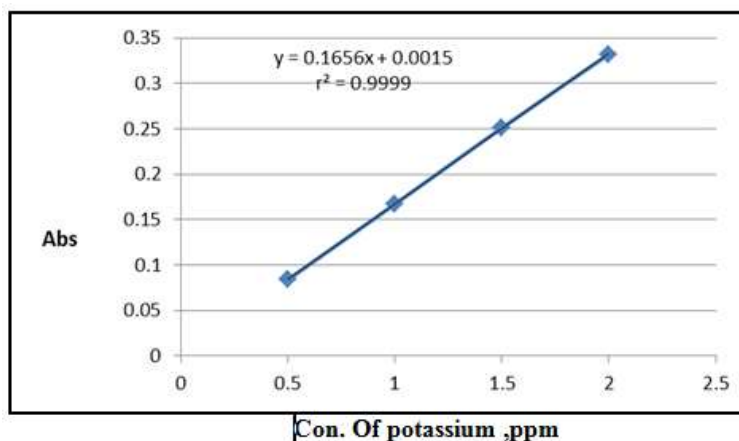


Figure (1) Calibration curve of Losartan Potassium by Atomic Absorption Spectroscopy (AAS)

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
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

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 (λ_{max}) 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 .

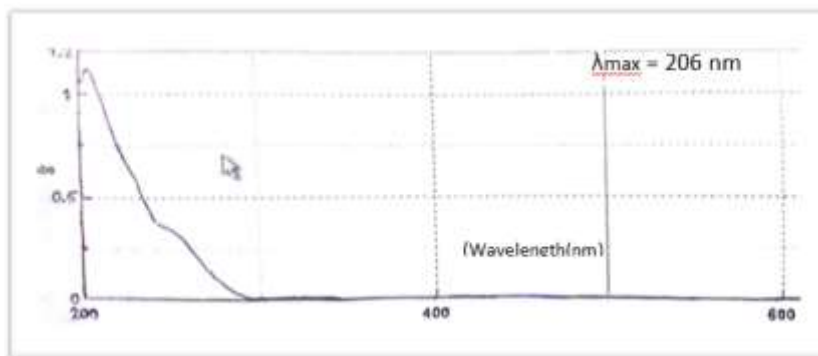


Fig. (2) UV - Visible Absorption Spectrometry for Losartan Potassium

- 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.

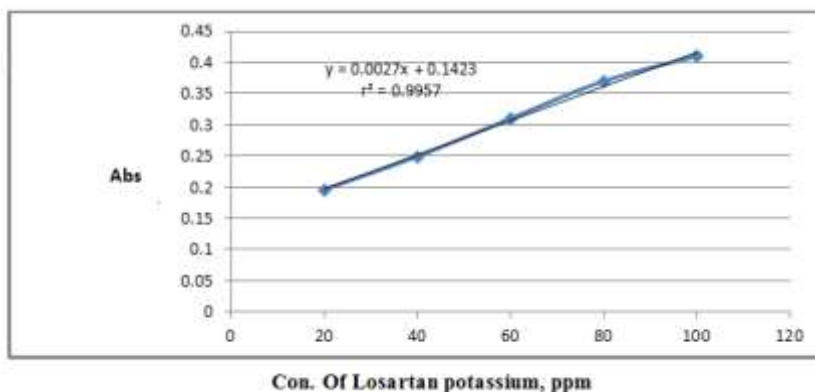


Figure (3) Calibration Curve of Losartan Potassium by (UV-Visible) method

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

Conc.of Losartan Potassium $\mu\text{g/ml}$	Rec(%)
present	Measurd
1000	965.55

Table (9) Detection limit of the method

Conc.ppm	X ⁻	S	D.L.ppm
20	19.86	0.308	0.930

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

Conc. of losartan potassium $\mu\text{g/ml}$	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

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.

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

البنفسجية – المرئية

ولاء حازم حميد¹ ، سرحان علي سلمان¹ ، صالح عبدالله أحمد²¹قسم الكيمياء ، كلية العلوم ، جامعة تكريت ، تكريت ، العراق²كلية الصيدلة ، جامعة تكريت ، تكريت ، العراق

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 الاستردادية هي (97.2%)، نسبة الخطأ المئوي (-2.8)، وحد الكشف (0.038 مايكروغرام/مل)، الانحراف القياسي النسبي لا تتجاوز (2.58%). قورنت النتائج مع طريقة الاشعة فوق البنفسجية – المرئية وكانت نسبة الاستردادية (96.5%)، وحد الكشف (0.93 مايكروغرام/مل)، ونسبة الانحراف القياسي النسبي لا تتجاوز (1.55%).