PREPARATION AND STUDY OF AMOXICILLIN SELECTIVE ELECTRODES AND THEIR APPLICATION WITH DERIVATIVE SPECTROPHOTOMETER IN PHARMACEUTICAL DRUGS

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Abstract

Amoxicillin trihydrate selective electrodes were prepared based on amoxicillin-phosphotungstate (Amox-PT) as an active sensor with different plasticizers, di-butyl phosphate (DBP), di-butyl phthalate (DBPH), di-octyl phthalate (DOPH), tri-butyl phosphate (TBP) and o-nitro phenyl octyl ether (NPOE) in PVC matrix membranes. The study was carried out to investigate the electrode parameters, effect of pH, selectivity and UV-derivative spectrophotometer technique. Internal filling solution of 10^{-3} M + 10^{-3} M NaCl was used to fill the electrodes. The best electrode was based on DBP plasticizer which gave a slope 58.7 mV/decade and detection limit of 2 x 10^{-6} M displayed good stability and reproducibility. The electrode was used to determine the amoxicillin in oral suspension and capsules. The results were compared with UV-derivative spectrophotometer technique and the recovery for the drugs obtained by second derivative are quite comparable with the recovery obtained by amoxicillin electrodes.

Keywords; Amoxicillin electrodes, Phosphotungstic acid ionophore, Derivative spectrophotometer, Amoxicillin determination.

Introduction

Amoxicillin trihydrate (amox) is an oral antibiotic with a wide spectrum of antibacterial activity, has the empirical formula C_{16} H_{19} $N_3O_5S.3$ H_2O and the molecular weight 419.4 gm/mole. Amoxicillin trihydrate contains not less than 95% and not more than 100.5% with reference to the anhydrous substances (1). Amoxicillin trihydrate is a white, or almost white crystalline powder, slightly soluble in water and alcohols, it dissolve in dilute acidic and alkaline solutions. Ion selective electrodes (ISEs) are used today in a wide range of applications and new uses constantly being reported in the literature. Characterization of bulk drugs has becomes increasingly important in the pharmaceutical industry.

Analytical techniques are commonly employed for this purpose by using drug-selective electrodes. The recent review of ion selective electrodes in medical drug determination was reviewed by Kharitonov (2), the theoretical approaches to optimization of the characteristics and mechanism of selective electrodes are discussed. Phosphotungstic acid was used for fabrication, optimization and some possible applications of novel mebendazole selective sensors was studied by Kumar et al. (3), the best membrane was based on BEP which gave a slope of 55.8 mV/decade, detection limit of 6.3×10^{-7} M and used for determination in pharmaceutical formulations.

Several electrodes were constructed and characterized by Nassory et al. (4) for the potentiometric determination of atenolol. Nassory et al. (5) construct several amines and amiloride selective electrodes using phosphotungstic acid ionophore with different plasticizers and the best electrode was based on DOPH and used for determination of amiloride in drugs. Ampicillin liquid membrane selective electrodes were constructed and studied by Al-Haidari et al. (6) using phosphotungstic acid with different plasticizers, the ampicillin electrode based on TBP gave a slope of 58 mV/decade, detection limit of 7.0×10^{-5} M. The stability of amoxicillin in acidic solution at pH 1.2 was determined by Tokumura and Machida (7) using two different methods, UV absorption and HPLC, the study indicated that amoxicillin degraded with rate constant 9.83×10^{-2} h^{-1} . Simultaneous spectrophotometric and

volumetric for determinations of amoxicillin, ampicillin and cloxacillin in drug formulations were studied by Qureshi et al. (8). Methods for the determination of organic substances by the derivative spectrophotometry (DS) technique have been developed mainly for application in the analysis of pharmaceuticals and biochemical interesting systems. The general aspects of UV derivative spectrophotometry and its advantages and limitations with respect to normal spectrophotometry are reviewed by Popovic et al. (9) during last five years (since 1994). A review was in analytical application in several fields and pharmaceutical drugs. Recent development of DS was reviewed by El-Sayed and El-Salem (10) ant its used in chemical and in pharmaceutical analysis. In this work several amoxicillin selective electrodes were prepared using phosphotungstic acid ionophore with different plasticizers in PVC membranes. The electrode based on DBP used for determination amoxicillin in oral suspension and capsules and to compare the results with UV derivative spectrophotometry.

Experimental parts

Apparatus

1-Double beam UV Visible spectrophotometer model (UV-1650 PC) Shimadzu, Japan
2-Infrared spectrophotometer SHIMADZU, FTIR-8000 (Japan).
3-Expandable ion analyzer, ORION, model EA 940, (U. S. A.).
4-Reference electrode single junction, ORION, model 90-01
5-Combined glass electrode Orion No.91-02, (Swiss made).
6-Magnetic stirrer.
7-Ultra sonic devise (ultrasonicator) (SONOREX), (W. Germany).
8-Ultra pure water manufacturing devise, (TORAYPURE), model LV-08 (Japan).
9-Silver wire coated with silver chloride
10-PVC tubing (6 mm i.d.).

Chemicals and reagents

Standard antibiotics, amoxicillin trihydrate, cephalexin monohydrate and cloxacillin sodium were obtained from the state company of drug industries and medical appliances (IRAQ-SDI-Samara). Commercial drugs, oral suspension amoxicillin 125 BP (APMOX) and amoxicillin capsules 250 BP (APMOX) manufactured by (Ajanta Pharmaceutical Limited Company, India). (APMOX is the trade name of the drug). Polyvinyl Chloride (PVC) type (Breons 110/10 BP Chemical U.K. Ltd.). The plasticizers are di-butyl phosphate, di-butyl phthalate, di-octyl phthalate, tri-butyl phosphate, o-nitro phenyl octyl ether and phosphotungstic acid were obtained from Fluka and BDH companies. All other chemicals and solvents are analytical reagent grade obtained from different sources. Stock solution of amoxicillin trihydrate (0.01 M), prepared by dissolving 0.2097 g of the drug into 50 ml water by using ultrasonicator to dissolve the drug.

Other standards were prepared by serial dilutions of the stock solution. Stock solution of phosphotungstic acid (0.01 M) was prepared by dissolving 1.44 g of the acid in 50 ml of water. 0.1M stock solutions of each interfering salts. NaCL, NH_4Cl, KCl, $CaCl_2$, $MgCl_2$,$CuSO_4$ and $Fe(NO_3)_3.3H_2O$ were prepared by dissolving 0.2922, 0.2672, 0.3729, 0.5550, 0.4761, 0.7980 and 2.0201 gm in 50 ml of water respectively.

0.01M solutions for cloxacillin sodium, ampicillin trihydrate, cephalexin monohydrate, sucrose and gelatin were prepared by dissolving 0.23795, 0.20175, 0.1827, 0.17115 and 0.2437 gm in 50 ml of water respectively. 5% w/v of KH_2PO_4 was prepared as an ionic strength adjusting buffer solution. The pharmaceutical drugs oral suspension amoxicillin 125 BP (APMOX) solution was prepared by dissolving all content to 1L with vigorous shaking followed by filtration the first part was rejected, the resultant concentration of drug is 2.5 mg.mL (5.961 M). 0.01 M amoxicillin capsules (APMOX) capsules 250 BP was prepared similar to standard the content of ten capsules were mixed and homogenized and weighted accurately, the weight of one capsule was diluted to 1L of water.

Preparation of ion-pair compound

The ion-pair of amoxicillin-phosphotungstate (Amox-PT) was prepared by

mixing equal amounts of 0.01 M acidified solution of the drug with 0.01 M phosphotungstic acid with stirring. The resulting a yellow precipitate obtained was sediment by centrifugation and extensively washed with de-ionized water and dried for 2 days in evacuated desiccator's.

Fabrications of the membrane and electrode

The method of immobilization the ion-pair compound into the PVC matrix membrane was made as described by Craggs et al. (11). A 0.04 g of (Amox-PT) mixed with 0.36 g plasticizer and 0.17 g PVC dissolved in 6 ml THF with stirring until a clear viscous solution was obtained. The resultant solution was poured into a glass casting ring about 35 mm in diameter, the solution was left for 2 days to allow slow evaporation of the solvent and formation a sensing membrane. Laboratory-made electrode body was used, which consisted of glass tube containing silver wire coated with silver chloride and internal filling solution. The electrode was made according to the procedure given in reference (12).

Results and discussion

(Amox-PT) as an electro active compound was used to prepare new sensors.

The electroactive compound was confirmed by using FTIR, the coordination sites of amoxicillin trihydrate involved in the bonding with phosphotungstic acid had been determined by comparision of the IR spectrum of the complex with that of the parent amoxicillin. The potentiometric response characteristics based on (Amox-PT) and five plasticizers, di-butyl phosphate (DBP), di-butyl phthalate (DBPH), di-octyl phthalate (DOPH), tri-butyl phosphate (TBP) and o-nitro phenyl octyl ether (NPOE) in PVC matrix were examined. The effects of the plasticizers were studied with respect to the slope, concentration range, detection limit, response time, life time and pH effect. All the membranes were soaked in 10^{-3} M amoxicillin solution for 2 hours in order to conditioning the membrane before use. Two different internal filling solutions were used; the first one was 10^{-3} M amoxicillin + 10^{-3} M HCl to calibrate the electrodes from 10^{-2} M to 10^{-7} M amoxicillin solutions at pH range 2.5 – 6.4. The second was 10^{-3} M+10^{-3} M NaCl used but with pH range 2–4. The best conditions for determination amoxicillin trihydrate were with internal filling solution of 10^{-3} M + 10^{-3} M NaCl. The slopes were near Nernistain slope with correlation coefficients around one. Therefore, this internal solution was fixed for all measurements. The results of electrode parameters measurements for amoxicilline selective electrodes are listed in Table (1). Electrode based on DBP gave a very good Nernistain slope equal to 58.7 mV/decade and detection limit of 2.0×10^{-6} M displayed good stabilitry and reproducibility during the measurements. The %RSD was 0.83 for average slope value (n=10) which was much lower than the other electrodes. Also a good electrode parameters were obtained for electrodes II and III but with life times around 20 and 30 days less than electrode I. Electrodes IV and V can not be used for measurements due to very short life times, 4 and 7 days, respectively. This short life time can be attributed to the behavior of the plasticizer with (Amox-PT) complex or may be the low viscosity of the plasticizers or incompatibility of the plasticizer with PVC matrix. The response time $t_{95\%}$ ranged from 30 sec. to 5 sec. for concentration 10^{-3} M amoxicillin and 50 sec. to 15 sec. for 10^{-4} M. A typical plot for calibration curves of electrodes based on five plasticizers phosphate DBP, DBPH, DOPH, TBP and NPOE are shown in Fig.(1).

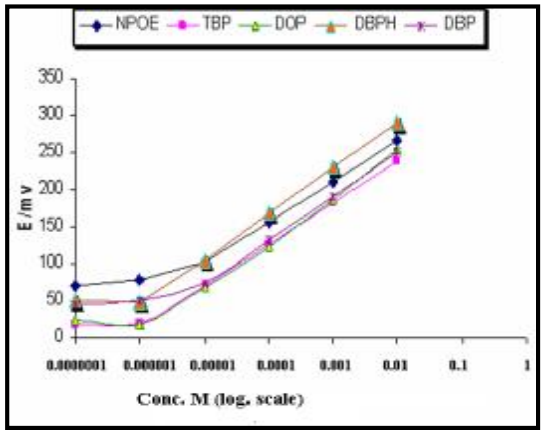


Fig.(1) : Calibration curves of amoxicillin selective electrodes using DBP, DBPH, DOP, TBP and NPOP plasticizers.

Effect of pH

The effect of pH on the response was examined by measuring the pH from 1.0 to 11.0 for the three different amoxicillin trihydrate 10^{-2} , 10^{-3} and 10^{-4} M, respectively. The pH range are listed in Table (2), At the strongly acid solution pH< 3 the drug undergoes a complex series of reactions leading to variety of inactive degradation products and protonated of the lacton nitrogen. At higher pH>6 the amoxicillin, like other penicillin group is a hydroscopic and effect by pH and the drug can be hydrolyze.

Selectivity

The influence of some inorganic cations and antibiotic of penicillin group on the response characteristics of the electrodes was investigated. Potentiometric selectivity coefficients were performed by separate solution method using 10^{-3} M concentration for both amoxicillin and interfering species ($a_A=a_B=10^{-3}$ M). The following equation was used to calculate the selectivity coefficients according to references 13 and 14.

$$\text{Log } K^{pot}_{amox} = [(E_B - E_A) / (2.303\ RT/zF)] + (1- z_A / z_B) \log a_A$$

E_A , E_B ; z_A , z_B ; and a_A, a_B are the potentials, charge numbers and activities for the primary A and interfering B ions, respectively, the values were calculated at $a_A = a_B$.

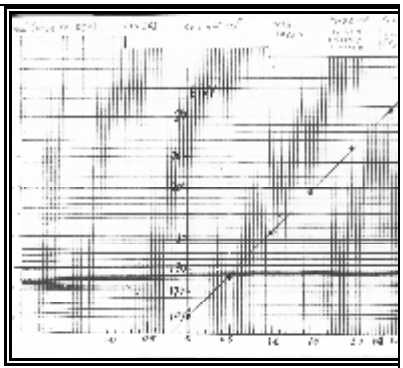
The results for selectivity coefficients were summarized in Table (3) using electrodes based on DBP and DOPH plasticizers and the potential of amoxicillin (a_A) at 10^{-3} M equal to 73 mV for electrode I and 84 mV for electrode III. The results in Table (3) show that the selectivity coefficients of monovalent cations are higher than divalent and trivalent cations. This may be attributed to the differences in ionic size, charge density, mobility and permeability. The values of selectivity coefficients for mono-valent (NH_4^+ and K^+) for the electrodes ranged from 0.58 to 3.75 except for Na^+ ion were ranged from 5.12 – 12.74. There is also an interference of ampicillin and cloxacillin on responses of amoxicillin selective electrodes. Other neutral species, sucrose and gelatin can not interfere with electrode response due to low values of selectivity coefficients, 0.09 and 0.22, respectively. None of the investigated species interfere seriously except monovalent ions.

Sample analysis

Quantitative determination of amoxicillin trihydrate in solutions was used using potentiometric techniques, direct method and increment method which include single standard addition (SSA), multi standard addition (MSA) and Gran's plot. In a direct method the ionic strength adjuster buffer (2 ml of 5% KH_2PO_4) was added to 50 ml of standard amoxicillin as well as the unknown samples. In increment method a 0.5 ml of amoxicillin standard solution 10^{-2} M was added to 20 ml of the sample. The results of quantitative measurements for the electrodes are listed in Table (4). The Gran's plot was constructed by using Orion Gran's plot paper with 10% correction for electrode I and a typical plot is shown in Fig.(2) for amoxicillin concentration at 1.015×10^{-4} M using electrode based on DBP plasticizer. Direct method was used for determination of amoxicillin in amoxicillin oral suspension and amoxicillin capsules. Two concentrations of oral suspension, 1.192×10^{-3} M and 5.96×10^{-4} M and for capsules, 1.0×10^{-3} M and 5.0×10^{-4} M were taken for determination of amoxicillin, respectively. The recoveries for oral suspension are 99.16 and 99.34% and for capsules are 98.8 and 98.2%, respectively.

amox-PT+DBP
Slope = 58.7
Reading

Vs ml added	***E/mV***
0	***146.7***
0.5	***176.7***
1.0	***190.7***
1.5	***199.4***
2.0	***205.6***
2.5	***210.6***



from the intercept of x-axis v=0.203 mL
C=1.015 x 10^{-4} M

Fig. (2) : Gran's plot for amox-PT+DBP electrode.

These recoveries are quite comparable with that given in the certificate of British pharmacopeia's 2000 (1). Due to the interference

of cephalexin monohydrate with the response of amoxicillin electrode or may be other drugs can be interfere.

Therefore, UV-derivative spectrophotometry, first, second, third and forth derivatives were used in this study for determination of amoxicillin drug and to compare with amoxicillin selective electrodes. The values of the wavelengths for normal spectrum and derivative spectra (^{1}D, ^{2}D, ^{3}D and ^{4}D) for amoxicillin in the range 2 to 100 µg/ml were determined and the results of applying the UV-derivatives for 30 µg/ml amoxicillin solution are listed in Table (5). As we noticed the accurate results were obtained by using second derivative spectrophotometry. The accuracy of the method depending on the wavelength chose not just the order of derivative. A typical plot for second derivative spectra at range 10–100µg/ml is shown in Fig.(3) and the calibration curve for ^{2}D ($d^2A/d\lambda^2$) for amoxicillin at 246 nm is shown in Fig.(4).

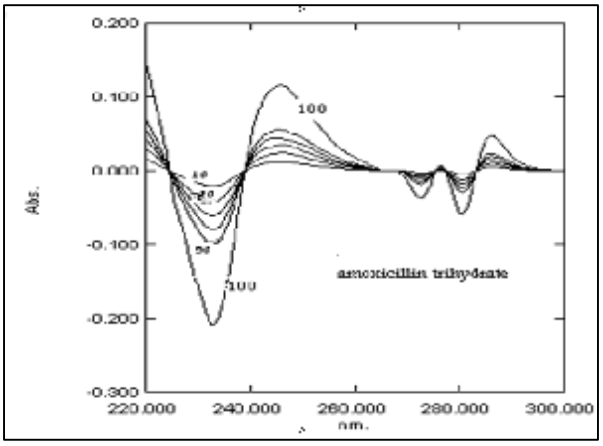


Fig.(3) : Second derivative spectra of amoxicillin solutions range 10 – 100 µg/ml.

Therefore, a second derivative was used for determination of amoxicillin in oral suspension and capsules at wavelength 246 nm. The recoveries for both drugs are 99.3 and 100.2% with relative standard deviations 0.62 and 0.43%, respectively. The results obtained from using amoxicillin electrodes for determination amoxicillin in oral suspension and amoxicillin capsules are quite comparable with the results obtained by second derivative spectrophotometry. DS method was more accurate for determination of amoxicillin in the presence of cephalexin monohydrate or other drugs in amoxicillin solutions.

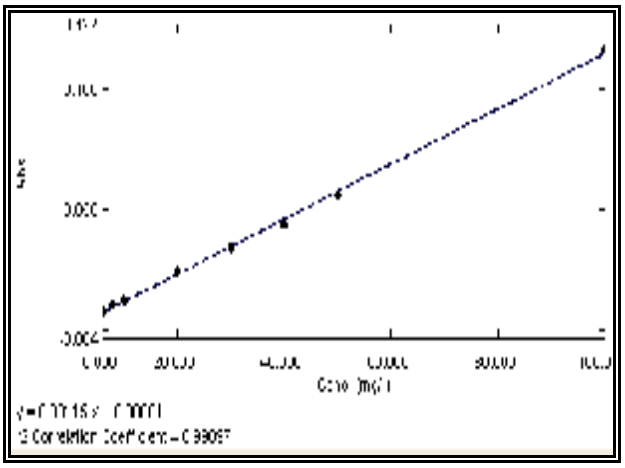


Fig.(4) : Calibration curves of second derivative for amoxicillin solutions range 6–100 µg/ml at 246 nm.

Comparison between ISE and DS Methods:

Methods for amoxicillin trihydrate determination was compared using F test, in order to compare between the proposed ISE methods with respect to DS method.

These methods are rapid, simple and accurate, to compare between them; 30 mg/L amox was determined by ISE using amox-PT+DBP electrode (direct method) (n=6), and by DS method using ^{2}D at 246 nm (n=8). The values of F at 95% confidence level is 3.97, standard deviation (s) were 0.268 and 0.233 for ISE and DS methods, respectively. Therefore the resulting F is equal to 1.323.

The results obtained by ISE were quite comparable with DS method. Other parameters for the methods are listed in Table (6)

Conclusion

Several amoxicillin selective electrodes can be prepared based on phosphotungstic acid as an ionophor with different plasticizers in PVC matrix membranes. Electrodes based on DBP, DBPH and DOPH plasticizers with longer life times can be used for determination of amoxicillin in drugs. The recovery obtained by the electrodes was good comparable with the recovery obtained by second derivative spectrophotometer.

Table (1)
The parameters of amoxicillin electrodes with different Plasticizers.

Membrane Composition	Slope mV/ decade	Correl.Coff .r^2	Concentration Range (M)	pH	Detection Limit (M)	Response time (second)		Life time day	%RSD
						10^{83} M	10^{84} M		
Amox-PT +DBP	58.7	01.00	$5x10^{-6} – 10^{-2}$	2.9 - 4.1	$2x10^{-6}$	30	50	~45	0.83
Amox-PT +DBPH	60.8	0.9995	$5x10^{-6} – 10^{-2}$	2.9 - 4.1	$1x10^{-6}$	10	20	~20	1.23
Amox-PT +DOP	54.1	0.9994	$5x10^{-6} – 10^{-2}$	2.9 - 4.1	$2x10^{-6}$	15	30	~30	1.35
Amox-PT +TBP	56.9	0.9991	$5x10^{-6} – 10^{-2}$	2.9 - 4.1	$6x10^{-6}$	5	15	~4	1.26
Amox-PT +NPOE	54.9	1.00	$5x10^{-6} – 10^{-2}$	2.9 - 4.1	$4x10^{-5}$	10	25	~7	1.65

Table (2)
Working pH ranges for amoxicillin selective electrodes with different amoxicillin concentrations.

Membrane No.	Plasticizer	pH range		
		10^{-2} M	10^{-3} M	10^{-4} M
I	DBP	2.0 – 6.0	2.0 – 6.0	2.0 – 4.5
II	DBPH	2.0 – 4.0	2.0 – 4.0	2.0 -4.5
III	DOPH	2.0 – 5.5	2.0 – 5.5	2.0 – 5.5
IV	TBP	2.0 – 5.5	2.0 – 5.5	2.0 – 4.5
V	NPOE	2.0 – 6.0	1.5 – 6.0	1.5 – 5.5

Table (3)
Selectivity coefficient values for amoxicillin electrodes based on DBP and DOPH plasticizers.

Interfering species	Selectivity coefficients, K			
	DBP		DOPH	
	E_B (mV) at 10^{-3} M	$K_{amox.}^{pot.}$	E_B (mV) at 10^{-3} M	$K_{amox.}^{pot.}$
Na^+	120	6.319	155	10.645
NH_4^+	99	2.773	98	1.816
K^+	102	3.119	115	3.750
Cu^{2+}	109	0.131	101	0.065
Ca^{2+}	119	0.848	121	0.153
Mg^{2+}	85	0.051	79	0.025
Fe^{3+}	180	0.661	179	0.574
cephalexin	40	0.274	55	0.290
Ampicillin	88	1.800	79	0.808
Cloxacillin	101	2.999	112	3.300
Sucrose	30	0.185	40	0.153
Gelatin	25	0.152	30	0.100

Table (4)

Determination of amoxicillin in the samples by potentiometric methods using amoxicillin selective electrodes

Membrane No.	Samples	Potentiometric methods			
		Direct	SSA*	MSA*	Gran's plot
I (Amox-PT+DBP)	$1.00x10^{-4}$	$1.01x10^{-4}$	$1.01x10^{-4}$	$1.008x10^{-4}$	$1.02x10^{-4}$
	%RSD	0.224	4.280	4.280	-
	%RE	1.00	1.00	0.80	1.00
II (Amox-PT+DBPH)	$1.00x10^{-4}$	$1.01x10^{-4}$	$1.01x10^{-4}$	$1.03x10^{-4}$	-
	%RSD	0.86	4.71	4.71	-
	%RE	1.00	1.00	3.00	-
III (Amox-PT+DOPH)	$6.50x10^{-5}$	$6.70x10^{-5}$	$6.60x10^{-5}$	$6.40x10^{-5}$	-
	%RSD	1.98	4.71	4.71	-
	%RE	3.08	1.54	-1.54	-
IV (Amox-PT+TBP)	$1.00x10^{-4}$	$1.02x10^{-4}$	$1.03x10^{-4}$	$1.03x10^{-4}$	-
	%RSD	1.87	3.10	3.10	-
	%RE	2.00	3.00	3.00	-
V (AmoxPT+NPOE)	$1.00x10^{-4}$	$1.03x10^{-4}$	$9.90x10^{-5}$	$1.02x10^{-4}$	$1.01x10^{-4}$
	%RSD	1.09	1.73	1.73	-

Each concentration represents an average of 3 measurements* The results of five additions.

Table (5)

Results of relative errors obtained from the calibration curves for normal and derivatives methods for 30µg/ml amoxicillin solution.

Method	Wavelength (nm)	Scale factor	Linear equation	Amoxicillin found µg/ml	Relative error %
Normal	**P= 272.5**		**$Y= 2.82x10^{-3} X – 3.21x10^{-3}$**	**30.095**	**0.317**
	P= 229		**$Y= 2.32x10^{-2} X + 8.77x10^{-3}$**	**30.289**	**0.963**
First derivative $^1D=dA/d\lambda$	**P= 267**	**10**	**$Y= 0.69x10^{-3} X + 0.13x10^{-3}$**	**30.236**	**0.820**
	V= 283.5	**10**	**$Y= -2.60x10^{-3} X + 0.84x10^{-3}$**	**30.246**	**0.820**
	V= 239	**10**	**$Y= -1.42x10^{-2} X – 2.1x10^{-3}$**	**30.310**	**1.033**
Second derivative $^2D= d^2A/d\lambda^2$	**P= 286**	**10**	**$Y= 0.48x10^{-3} X + 0.12x10^{-3}$**	**28.917**	**-3.610**
	P= 246	**10**	**$Y= 1.15x10^{-3} X + 0.01x10^{-3}$**	**29.557**	**-1.477**
	V= 280.5	**10**	**$Y= -0.59x10^{-3} X + 0.03x10^{-3}$**	**30.458**	**1.527**
	V= 233	**10**	**$Y= -2.07x10^{-3} X + 0.48x10^{-3}$**	**29.700**	**-1.000**
Third derivative $^3D= d^2A/d\lambda^3$	**P= 282.5**	**20**	**$Y= 0.75x10^{-3} X – 0.67x10^{-3}$**	**30.227**	**0.757**
	P= 275	**20**	**$Y= 0.51x10^{-3} X – 0.26x10^{-3}$**	**29.922**	**-0.260**
	V= 288	**20**	**$Y= -0.19\ 10^{-3} X – 0.05x10^{-3}$**	**31.316**	**4.387**
	V= 278.5	**20**	**$Y= -0.65x10^{-3} X – 0.37x10^{-3}$**	**31.118**	**3.727**
Fourth Derivative $D= d^4A/d\lambda^4$	**P= 280.5**	**40**	**$Y= 1.30x10^{-3} X – 0.28x10^{-3}$**	**30.215**	**0.717**
	P= 273.5	**40**	**$Y= 0.78x10^{-3} X – 0.64x10^{-3}$**	**29.927**	**-0.243**
	V= 284.5	**40**	**$Y= -0.73x10^{-3} X + 0.82x10^{-3}$**	**29.890**	**-0.367**
	V= 277	**40**	**$Y= -1.15x10^{-3} X + 0.08x10^{-3}$**	**30.504**	**1.680**

Table (6)
The parameters of ISE and DS methods to determine amoxicillin trihydrate (30 mg/L).

parameter	ISE using amox-PT+DBP	DS using ^{2}D at 246 nm
Linear range	$5x10^{-5}$- $1x10^{-2}$ M (21-420 mg/L)	$4x10^{-6}$-$2x10^{-2}$ M (2-100 mg/L)
Detection limit	$2x10^{-5}$M (8.4 mg/L)	$4x10^{-6}$ M (2 mg/L)
Working pH range	≈ 2.9 – 4.1	2.0 – 7.0
Standard deviation	0.268	0.233
RSD%	0.893	0.777
S^2	0.0718	0.0529
Amox .found mg/L	30.183	30.124
RE%	0.61	0.41
Recovery%	100.61	100.41

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الخلاصة

حضرت أقطاب إنتقائية للأموكسيسلين بتحضير المادة الفعالة (أموكسيسلين- فوسفوتنكستيت) Amox-PT مع الملدنات المختلفة وهي داي بيوتيل فوسفيت (DBP) , داي بيوتيل فثاليت (DBPH) ,داي اوكتيل فثاليت (DOPH) ,ثراي بيوتيل فوسفيت (TBP) و اورثو نيترو فنيل إيثر (NPOE) في غشاء اصله من بولي فاينيل كلورايد (PVC). الدراسة شملت خواص ألأقطاب كتأثير الدالة الحامضية pH, المحلول الداخلي للأقطاب, الأنتقائية . إن أفضل قطب المحضر باستعمال الملدن DBP والمحلول الداخلي (10^{-3}M Amox+10^{-3}M NaCl) حيث ان الميل 58.7 mV/decade وبحدود تحسس $2x10^{-6}$M وله ثبوتية وتكرارية جيدة. إن هذا القطب أستخدم لتقدير الأموكسيسلين في المستحضرات الدوائية الكبسول والمعلق الفموي. النتائج تطابقت مع نتائج المشتقة الطيفية الثانية.