المجلد (12) العدد (2)
لسنة 2020

المجلة العراقية
لبحوث السوق وحماية المستهلك

DOI: http://dx.doi.org/10.28936/jmracpc12.2.2020.(9)

SYNTHESIS NEW LIQUID ELECTRODES FOR DETERMINATION DOMPERIDONE MALEATE BASED ON A MOLECULARLY IMPRINTED POLYMER

Zahraa Mahdi[1],Yehya Kamal Al-Bayati[2]
[1]Researcher, Department of Chemistry, College of Sciences, University of Baghdad, Baghdad, Iraq zezoqween@gmail.com
[2]Prof. Dr. Department of Chemistry, College of Sciences, University of Baghdad, Baghdad, Iraq yahyaalbayti@yahoo.com

الاستلام 17/ 3/ 2020، القبول 24/ 6/ 2020، النشر 31/ 12/ 2020

ABSTRACT

Liquid electrodes of domperidone maleate (DOMP) imprinted polymer were synthesis based on precipitation polymerization mechanism. The molecularly imprinted (MIP) and non-imprinted (NIP) polymers were synthesized using DOMP as a template. By methyl methacrylate (MMA) as monomer, N,Nmethylenebisacrylamide (NMAA) and ethylene glycol dimethacrylate (EGDMA) as cross-linkers and benzoyl peroxide (BP) as an initiator. The molecularly imprinted membranes were synthesis using acetophenone (APH), di-butyl sabacate (DBS), Di octylphthalate (DOPH) and triolyl phosphate (TP)as plasticizers in PVC matrix. The slopes and limit of detection of liquid electrodes obtained from the calibration curves ranged from (-18.88– -29.01) mV/decade and (4.0×10^{-5} – 6.0×10^{-5}) M, respectively and the response time was about 60 seconds. The Liquid electrodes were filled with (10^{-2} M) standard solution of the drug and observed stable response for a pH ranged from 2.0 to 11.0 and with good selectivity for over several species. The fresh electrodes of synthesis were effectively used in the pharmaceutical sample to determine DOMP without any time consuming pretreatment measures.

Keywords: Molecularly imprinted electrodes, Domperidone maleate, methyl methacrylate, monomers,cross-linkers, ethylene glycol dimethacrylate.

DOI: http://dx.doi.org/10.28936/jmracpc12.2.2020.(9)

الاستخلاص بالطور الصلب لادوية اضطراب حركة الجهاز الهضمي في المستحضرات الصيدلانية باستخدام البوليمر بالطبعة الجزيئية بتقنيات تحليلية مختلفة

زهراء مهدي[1]*، يحيى كمال البياتي[2]
[1]باحثة، قسم الكيمياء، كلية العلوم، جامعة بغداد، بغداد، العراق zezoqween@gmail.com
[2]أستاذ الدكتور، قسم الكيمياء ، كلية العلوم ، جامعة بغداد ، بغداد ، العراق yahyaalbayti@yahoo.com

Received 17/ 3/ 2020, Accepted 24/ 6/ 2020, Published 31/ 12/ 2020

الخلاصة

الأقطاب السائلة للبوليمر مطبوع عليها دومبيريدون (DOMP) تم تصنيعها بناء على آلية البلمرة (الترسيب)، وتم تصنيع البوليميرات المطبوعة جزيئيًا (MIP) وغير المطبوعة (NIP) باستخدام DOMP كقالب بواسطة methyl

* البحث مستل من رسالة ماجستير للباحث الاول.

methacrylate (MMA) كمونومر، N,N methylenebisacrylamide (NMAA) و ethylene glycol dimethacrylate (EGDMA) كموصلات متقاطعة و benzoyl peroxide (BP) كمبادر، وكانت الأغشية المطبوعة جزيئياً عبارة عن تخليق باستخدام الأسيتوفينون (APH)، ثنائي بوتيلالسابات (DBS)، ثنائي أوكتيلالفثالات (DOPH) وثلاثي ثلاثي الفوسفات (TP) كمواد ملدنة في مصفوفة PVC، وتراوحت المنحدرات وحدود الكشف عن الأقطاب السائلة التي تم الحصول عليها من منحنيات المعايرة من (-18.88–29.01) فولت/ عقد و(4.0 × 10-5 - 6.0 × 10-5) م، على التوالي وكان وقت الاستجابة حوالي 60 ثواني، وتمتلئ الأقطاب السائلة بمحلول قياسي للدواء (10-2 M) ولاحظت استجابة مستقرة لقيمة الأس الهيدروجيني تتراوح من 2.0 إلى 11.0 ومع انتقائية جيدة لأكثر من عدة أنواع، وتم استخدام الأقطاب الكهربائية الحديثة للتجميع بشكل فعال في العينة الصيدلانية لتحديد DOMP دون الحاجة إلى اتخاذ إجراءات معالجة مسبقة للوقت.

الكلمات المفتاحية: اقطاب الطبعة الجزيئية، دومبريدون ماليت، مثل ميثااكريليت، بادىء، رابط، اثيلين كلايكول داي مثل اكريليت.

INTRODUCTION

Molecularly impressed polymers (MIPs) are a promising solution to tailor-made binding receptor locations by rearranging templates and rearranging functional monomers Functional monomers and cross linkers involving the formation of cavities in which the model is placed in the presence of template molecules. By bonding with hydrogen In the first step, the template interacts with a functional monomer, reversible covalent bonds, electrostatic interactions, and van der Waals. In a second phase, In the presence of a large excess cross-linking agent, the monomer-template complex is polymerized. The chemical bonds between the monomer and the cross-linker make room for the functional monomer model. Finally, the template can be separated from the polymer framework after polymerization, which shows binding sites with additional shape, size and chemical features **(Al-Bayati & Al-jabari, 2015)**.

Domperidone maleate

Domperidone (Figure 1) malate a white or almost white powder , very slightly soluble in water, sparingly soluble in dimethylformamide, slightly soluble in methanol, very slightly soluble in alcohol can be used to relieve gastrointestinal symptoms in Parkinson's disease; it blocks peripheral D2 receptors but does not cross the blood-brain barrier in normal doses (the barrier between the blood circulation of the brain and the rest of the body) so has no effect on the extrapyramidal symptoms of the disease in addition to this, domperidone **(Pyka *et al.*, 2011)**, may enhance the bioavailability (effect) of levodopa (one of the main treatments in Parkinson's disease). well with relief of symptoms. may be useful in diabetic and idiopathic gastroparesis.

5-chloro-1-(1-[3-(2-oxo-2,3-dihydro-1H-benzo[d]imidazol-1-yl)propyl]piperidin-4-yl)-1H-benzo[d]imidazol-2(3H However, increased rate of gastric emptying induced by drugs like domperidone does not always correlate (equate)-on ($C_{22}H_{24}C_lN_5O_2$,$C_4H_4O_4$).

Although these features make domperidone **(Araujo *et al.*, 2011)**, a useful drug in Parkinson's disease, caution is needed due to the cardiotoxic side effects of domperidone especially when given intravenously (**Preinerstorfer *et al.*, 2009)**, in elderly people and in high doses (> 30 mg perday). A clinical sign of domperidone's potential toxicity to the heart is the prolongation (lengthening) of the QT interval **(Bally *et al.*, 2018),**(a segment of the heart's electrical pattern). Domperidone may be used in functional dyspepsia in both adults and children.

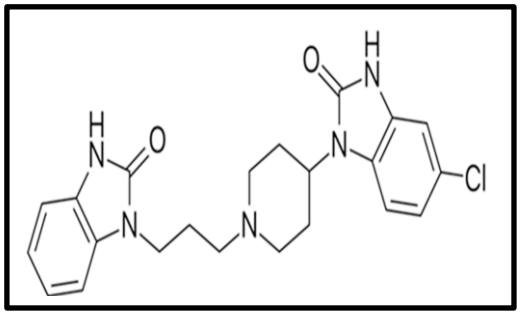


Figure (1): Domperidone based polymer electrodes have been prepared as a PVC matrix membrane template and electrode specifications have been studied in this research **(Damiani *et al.*, 2002)**.

Experimental

Chemicals

domperidone was obtained from the State Company of Drug Industries and Medical Appliances (IRAQ-Medial East-Baghdad). The Commercial Motilium 30 tablets 10 mg (Janseen-UK) Motalone 30 tablets 10 mg (Mediotic-Syria) Dompy 30 tablets 10 mg (Jamjoom-KSA) acetophenone (APH), di-butyl sabacate (DBS), Di octylphthalate (DOPH) and triolyl phosphate (TP) In addition to metal salts, they were bought from Sigma-Aldrich and used as obtained. methyl methacrylate (MMA) (99%),ethylene glycol dimethacrylate (EGDMA) (99%), N,Nmethylenebisacrylamide (NMAA), Benzoyl peroxide (BP) (78%) were bought from Sigma-Aldrich. The chemicals that have been used in the quest have elevated purity that need not be purified.

Apparatus

A digital voltmeter (HANA pH 211 instrument Microprocessor pH meter) was used to perform potential measurements.Digital pH meter pH measurements (wissenschaftlich-TechnischeWerkstätten GmbH WTW/ pH meter in laboratory pH720-Germany) were performed; UV-Visible double-beam spectrophotometer (UV-1800 PC) SHIMADZ (Japan), computer interfaced via the SHIMADZU UV probe information scheme (version 1.10), using 1.00 cm quartz cells, SHIMADZU infrarot spectrophotometer, FTIR-8000 (Japan),Scaning Electron Microscopy (SEM) [JSM-6390A] (Tokyo, Japan) and sensitive balance (Electronic balance ACS120-4 Kern &Sohn GmbH, Germany.The performance of the electrode was investigated by measuring the potential of domperidone solutions at room temperature with a concentrations range from10^{-2} to 10^{-6}M. For the accuracy the potential of solutions were measured after the arrival of the internal and external solution to the equilibrium, then the potential recorded.

Synthesis of the imprinted polymer (MIP)

Domperidone molecularly imprinted polymer (DOMP.-MIP1) were achieved by mixed , the template (DOMP) 0.23mmol (0.1g) was dissolved in 5 mL of DMF in a thick walled glass tube. A functional monomer methylmethacrilate (MMA) 11.6 mmol (1g), cross-linker N,Nmethylenebisacrylamide (NMAA) 3.25 mmol (1.5g) and initiator (BPO) 0.09 mmol (0.024g), and the seconddomperidone molecularly imprinted polymer (DOMP.-MIP2) were achieved by mixed , the template (DOMP) 0.997 mmol (0.425g) was dissolved in 5 mL of DMF in a thick walled glass tube. A functional monomer Methacrylic acid (MAA) 6.5 mmol (0.6549g), cross-linker Ethylene glycol dimethacrylate (EGDMA) 20 mmol (3.9644g) and

initiator (BPO) 0.2 mmol (0.05g) were added later to the above solution respectively. The mixture was degassed by purging nitrogen for 30 minutes in an ultrasonic water bath. While maintaining flow of nitrogen, the glass tube was removed from the ultrasonic water bath, sealed and placed inside a water bath at 60°C to allow initiation of the reaction. white colored polymers with a rigid structure were formed, Non-reacted species (excessive reagents or template) were removed from the polymers by consecutive washout of the particles with methanol then acetic acid and dried at room temperature overnight. The template was successively removed by repeated washing with the MIPs with 100 mL portions of 30 percent (v / v) acetic acid / methanol solution using soxhlet removal. The polymer was dried at (35-45) 0C for (24-48) hours .

The polymers were then crushed and ground with mortar and pestle and tested to a particle size of 125µm (using 100 mesh sieves): It was used in the selective sensor membrane as an active material. The unprinted polymer (NIP) was produced in the same way, but without the drug template.. For the preparation of specific PVC membranes, high molecular weight PVC (0.17 g) is mixed with MIP (0.02 g) and plasticizer (0.4 g) until the solution is homogenized, then add THF (4-5 mL) and stirred.The solution was transferred to a 5 cm dia glass board based glass vessel. Circular section for 24 hours to allow this combination to evaporate.A glass tube contained a silver wire painted with silver chloride and filled with 0.1 M normal Lansoprazole solution was tightly connected to one end of the Tygon tube while the second end of the tube was tightly connected to 10 mm dia.PVC membrane circular disk using a focused PVC / THF solution as a glue for electrode production.For the sake of clarity of the particle morphology and layout, scanning electron microscope (SEM) has been used. (Figure 2 and 3) shows the morphology of MIP_1 and NIP_2 membranes for Domperidone before and after washing. The binding sides to the polymer may be indicated by a porous surface (Figure 2 and 3a) about 1mm. (Figure 2 and 3b) indicates clear holes that were collected in dimensions of around 50 µm and removed through soxhlet extraction.

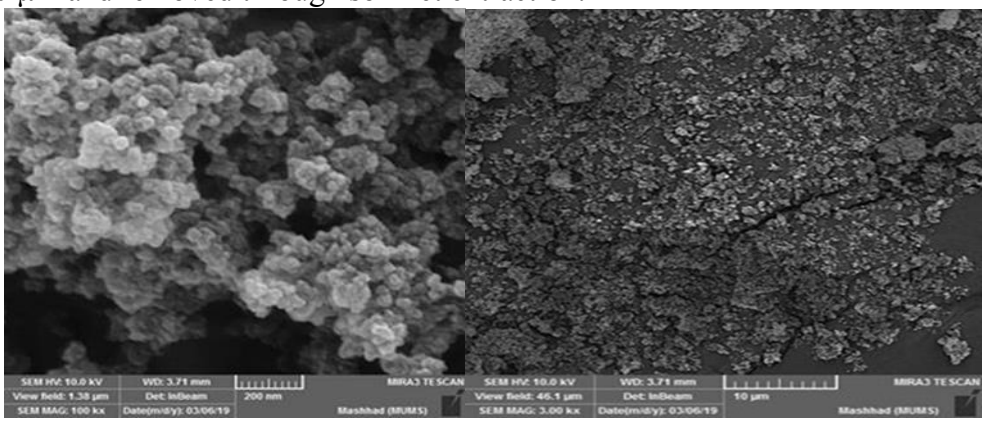


Figure (2): SEMphotographofthesurfaceofMIP_1**.**
a: before washing.
b: after washing

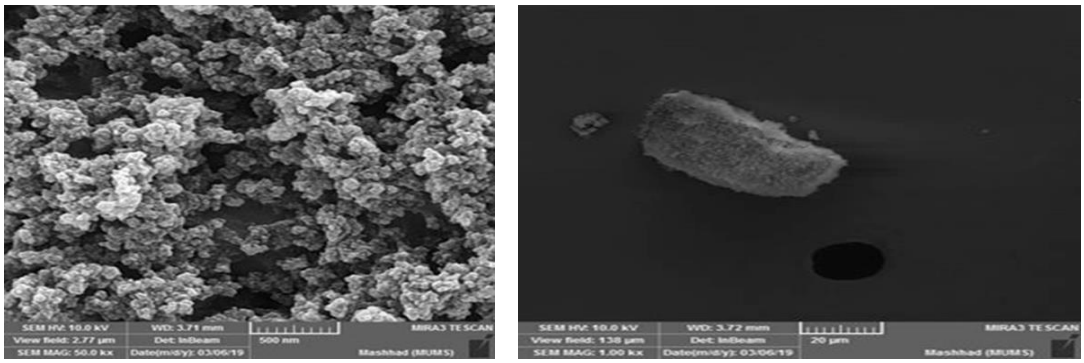


Figure (**3)**: SEM photograph of the surface of MIP_2.
a: before washing.
b: after washing

Potential measurements

Measurements were carried out in a 50 mL double walled glass cell, magnetic stirring was used for obtain a homogeneous solution and under laboratory. The effectiveness of the electrodes was scrutinized by measuring the ability of conventional medication alternatives prepared with a concentration range of 10^{-2} to 10^{-6} M through serial dilution. From the calibration curve, the operating life of the slope, detection limit, and response time were calculated.

Preparation of Pharmaceutical Samples

To obtain the powder of pharmaceutical samples from tablets using pestle and mortar to grind the tablets, a suitable weight was taken for the preparation of 100 ml solutions.
Appropriate quantity of methanol (CH_3OH) used or dissolved pharmaceutical samples and completed for more than 30 minutes in the volumetric flask of methanol and using the magnetic agitator **(Lenik 2013)**. The solution was then filtered using 0.07µm cellulose filter paper to repair and obtained Domperidone concentrations of 1 x10 $^{-3}$ M and 1 x 10 $^{-4}$ M.

Liquid Membranes Electrode

MIP based liquid electrodes, their concentrations range and slopes response to Nernstianequation has been investigated. The membranes of MIP made of the monomers MMA with a PVC matrix using two plasticizers APH and DBS. The internal solution was used 0.01M aqueous standard solution of drug for all liquid electrodes. Experimental results of synthesis of molecularly imprinted (MIP) and non-imprinted polymers (NIP) based on monomer MMA and cross linker (NMAA). The plasticizer is an essential part of the sensing membrane which have important role as a solvent for the different components and determines the mobility of the analyze in membrane. Both of the plasticizers that are used, APH and DBS, are suitable for the fabrication of MIP-based DOMP electrodes. Four membranes of the different compositions were prepared using two different plasticizers**(Valsami & Macheras, 1989; Lenik *et al.*, 2002; Santini *et al.*, 2006; Lenik *et al.*, 2008)**. Electrode specification findings were acquired from the calibration curves mentioned in (Table 1).

Table (1): Parameter of DOMP-MIP electrodes based on different plasticizers.

Parameter		
Membrane composition	**DOMP-MIP1+DBS (1)**	**DOMP-MIP1+APH (2)**
Slop (mV/decade)	-18.88	-20.35
Linearity range (M)	0.01 - 1×10^{-4}	$^{3-}10\times1$ - 1×10^{-4}
R^2	0.9935	0.998
Correlation coefficient	0.9967	0.9989
Detection limit (M)	6×10^{-5}	4×10^{-5}
Life time(day)	17	11
Membrane composition	DOMP-MIP2+DOPH (3)	DOMP-MIP2+TP (4)
Slop (mV/decade)	-29.01	-20.12
Linearity range (M)	0.01 - 1×10-4	0.01 - 1×10-4
R2	0.9943	0.9981
Correlation coefficient	0.9971	0.9990
Detection limit (M)	4×10-5	6×10-5
Life time(day)	22	13

The slopes of the electrodes ranged between -18.88-29.01 mV/decade and linear dynamic ranges between0.01-1.0 $x10^{-4}$M. In generally the preparation electrodes have a short response time (about 60 second) mostly at high concentrations. The values listed in (Table 1) also indicate the electrodes IQ and IIIQ give the good results therefore, the liquid electrode were used to determine both drugs in pharmaceutical samples.

Influence of pH

The impact of pH (Figure 4) on the possible values of the four electrodes over the pH range was researched from 2 to 11 and adjusting the pH by adding drops of 0.1 M HCl and 0.1 M NaOH to the aqueous solutions of the drugs and the obtained potentials at each value were recorded. The effect of pH on the electrode potential was recorded for concentrations range from 1×10^{-4} to 1×10^{-3} M of standard solutions of drugs. The obtained results are shown in (Table 2) and the typical plot of electrode potential versus pH for electrode IQand IIIQ are shown in Figure4.

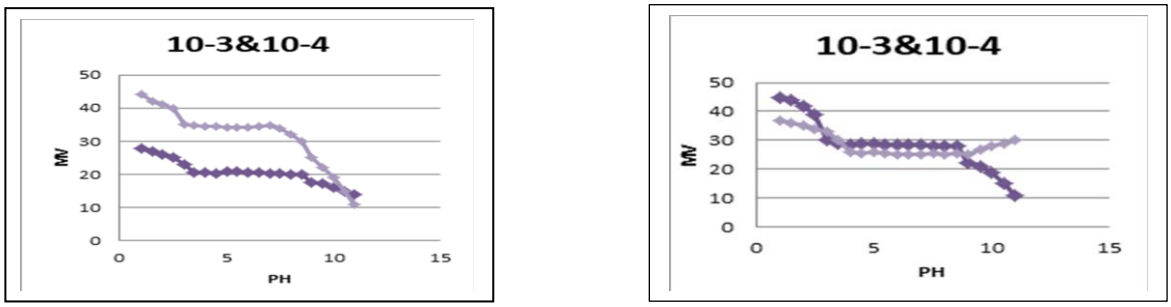


Figure (4): Typical plot of electrode response versus pH of DOMP-MIP electrodes at different Concentrations.

Table (2): Working pH ranges for DOMP-MIP electrode.

Electrode No.	Membrane composition	pH range	
		$1x10^{-4}$	$1x10^{-3}$
IQ	DOMP-MIP1 + DBS	3-7.5	3.5-8.5
IIQ	DOMP-MIP1 + APH	4.0-9.0	4.5-9.5
IIIQ	DOMP-MIP2+ DOPH	4.0-9.0	3.5-8.5
IVQ	DOMP-MIP2 +TP	4.5-9.0	4.5-8.0

Response time and life time

The response time for all DOMP.MIP electrodes was obtained from the dynamic potential response at concentration range between 5×10^{-5}-1×10^{-2} M by measuring the time required to reach 95 % equilibrium potential. The results indicate that the response time of the electrodes were approximately 25.2 seconds for the solution of Domperidone at high concentration 10^{-2}M and about 59 seconds at low concentration10^{-5}M. The electrode lifetime was obtained by measuring the slope periodically from calibration curves for DOMP.MIP during 17-32 days as shown in (Table 3).

Table (**3):** Response time of Domperidone electrode.

Membrane	Conce. (M)	(mV) at t/100	Time (s) at 95%	Time (s) at 100%
DOMP-MIP1+DBS	1×10^{-2}	39.9	39	41
	5×10^{-3}	27.8	46	49
	1×10^{-3}	49.1	48	51
	5×10^{-4}	33.2	55	57
	1×10^{-4}	9.9	56	58
	5×10^{-5}	11.3	57	59
DOMP-MIP1+APH	1×10^{-2}	3.4	36	37
	5×10^{-3}	1.7	48	50
	1×10^{-3}	5.1	56	57
	5×10^{-4}	9.7	35	36
	1×10^{-4}	10.3	39	40
	5×10^{-5}	15.6	40	41
DOMP-MIP2+DOPH	1×10^{-2}	14.5	55	58
	5×10^{-3}	18.5	52	55
	1×10^{-3}	21.5	50	53
	5×10^{-4}	34.5	44	46
	1×10^{-4}	37	43	45
	5×10^{-5}	54	40	41
DOMP-MIP2+TP	1×10^{-2}	1.8	35	36
	5×10^{-3}	3.5	36	37

	1×10^{-3}	5.2	39	40
	5×10^{-4}	9.8	40	41
	1×10^{-4}	10.4	49	50
	5×10^{-5}	15.7	56	57

Selectivity coefficient

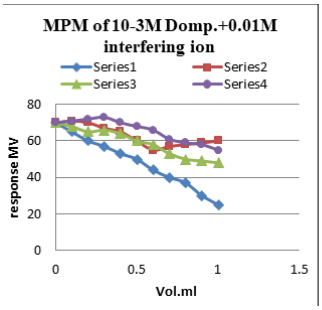
MPM is used for electrodes to determine the potentiometric selectivity coefficients (KpotA,B) associated with two ions whatever their charge, as MPM theory is basis upon layers of electrical diffuse on both sides (the aqueous and the membrane of the interface), so it is not depend on equation of Nicolsky-Eisenman. With respect to MPM, the coefficients of selectivity for equal charge ions (i.e. ZA=ZB) are stated as the ratio of the primary and interfering ions concentrations within aqueous solutions at which as much as the permeability of the primary and interfering ions which passing through the membrane surface selectively **(Mousavi *et al.*, 2018)**. The selectivity coefficients of unequal charge ions (i.e. ZA≠ZB), that are not only represented the primary and interfering ions amounts which permeated through the surface of membrane (as a function), but they are also identify the concentration of primary ion within the initial reference solution and the value of delta EMF. Using the following equation, the selectivity coefficient is provided in this technique:-

$K^{pot}_{A,B}$= (a'A -aA) /aB

The results have shown in (Table 4) and (Figure 5 and 6) regarding the coefficient of selectivity have been computed through the interfering ion concentration which gave a potential difference as much as that the amount induced due to the increasing in the concentration of primary ion **(Moody & Thomas, 1988; Ghenidii 2011).**

Table(4): Result of coefficients of selectivity using distinct solution technique for some interfering species.

Membrane Composition	**Interfering-Ion (1×10^{3})M**	**K^{MPM} ΔE=5**	**K^{MPM} ΔE=10**
DOMP-MIP1+DBS	K^{+1}	0.6541	0.5187
	Ca^{+2}	0.7019	0.5632
	Al^{+3}	0.7312	0.6251
	Interfering-Ion(1×10^{-4})M	K^{MPM}ΔE=5	K^{MPM}ΔE=10
	K^{+1}	0.1001	0.1000
	Ca^{+2}	0.1902	0.1107
	Al^{+3}	0.2003	0.2102
DOMP-MIP4+DOPH	K^{+1}	0.6611	0.6198
	Ca^{+2}	0.6642	0.5827
	Al^{+3}	0.7172	0.4812
	Interfering-Ion (1×10^{-4})M	K^{MPM} ΔE=5	K^{MPM} ΔE=10
	K^{+1}	0.6123	0.3696
	Ca^{+2}	0.5385	0.4012
	Al^{+3}	0.4108	0.3602



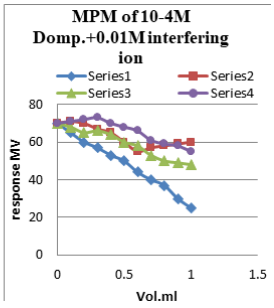
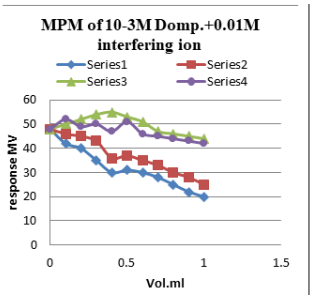


Figure (5): Selectivity of (DOM-MIP1+DBS)



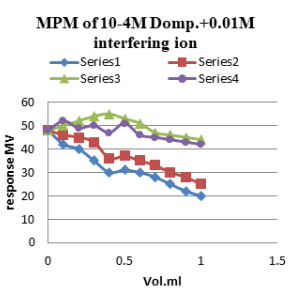


Figure (6): Selectivity of (DOMP-MIP2+DOPH)

Quantitative analysis

The accuracy of electrodes IQ and IIIQ were measured by determining Domperidonein synthetic solutions of 1×10^{-3} and1×10^{-4} M using standard addition method. Excellent results of (%) recovery were obtained in the range 94.95 to 105.6. A typical plot for membrane IQ and IIIQ at concentration of synthetic solution (1×10^{-3}, 1×10^{-4}) M is shown in (Figure 7 and 8) and the standard solution added was 0.01 M.

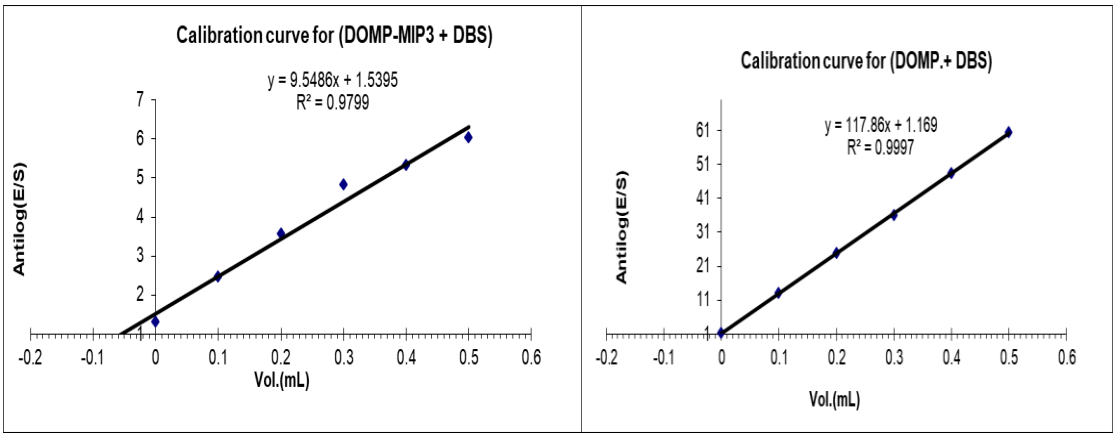
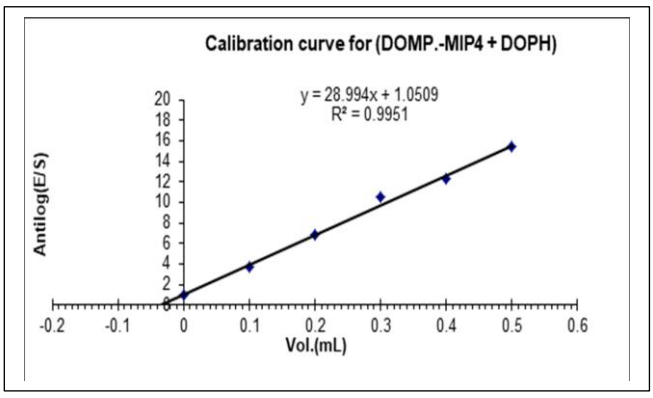


Figure (7): Variation of antilog (E/S) of synthetic solution of 1×10^{-3}, 1×10^{-4} M versus of standard DOMP added using electrode (IQ).



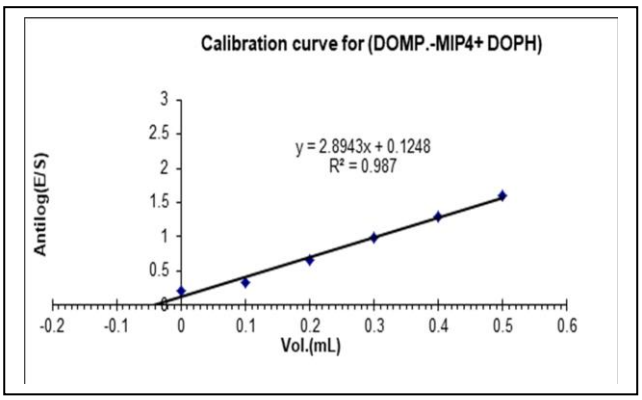


Figure (8): Variation of antilog (E/S) of synthetic solution of $1x10^{-3}$, $1x10^{-4}$ M versus of standard DOMP added using electrode (IIIQ).

Applications of pharmaceuticals

Ion selective electrodes that based on molecularly imprinted polymers were used for determination of Domperidone pharmaceuticals. This ISEs measurements including: standard addition, direct, Gran plot and multiple standard addition method. Preparation solutions of Domperidone concentrations 1×10^{-3} and 1×10^{-4} M. using membrane IQ based on DBS and IIIQ based on DOPH as plasticizer. The RE%, RC% and RSD% were calculated of Domperidone pharmaceuticals. The results obtained represented in the (Table 5 and 6).

Table (5): Results of recovery and standard deviation of commercial drugs obtained by using membrane IQ.

Pharmaceutical	**(KSA)**			
Measurement by using ISEs methods				
	Standard sample (1×10^{-3})			
Parameter	*RSD%	RC%	RE%	*Con. found
Direct	2.30	97.10	-2.68	0.9710×10^{-3}
SAM	2.41	97.99	-2.01	0.9799×10^{-3}
MSA	-----	99.91	-0.09	0.9991×10^{-3}
TITR	1.15	102.22	2.22	1.0222×10^{-3}
	Standard sample(1×10^{-4})			
Parameter	*RSD%	RC%	RE%	*Con. found
Direct	2.70	98.80	-1.2	0.9880×10^{-4}
SAM	2.66	97.72	-2.28	0.9772×10^{-4}
MSA	-----	98.99	-1.07	0.9899×10^{-4}
TITR	2.81	103.31	3.31	1.0331×10^{-4}
Pharmaceutical	(SYRIA)			
Measurement by using ISEs methods				
	Standard sample (1×10^{-3})			
Parameter	*RSD%	RC%	RE%	*Con. found
Direct	1.03	100.93	0.93	1.0093×10^{-3}
SAM	1.71	97.80	-2.2	0.9780×10^{-3}
MSA	-----	99.92	-0.09	0.9992×10^{-3}

TITR	1.15	102.59	2.59	1.0259×10^{-3}
	Standard sample(1×10^{-4})			
Parameter	*RSD%	RC%	RE%	*Con. found
Direct	2.48	97.32	-2.68	0.9732×10^{-4}
SAM	1.55	97.99	-2.01	0.9799×10^{-4}
MSA	-----	100.04	0.04	1.0004×10^{-4}
TITR	1.31	103.09	3.09	1.0309×10^{-4}
Pharmaceutical	(UK)			
Measurement by using ISEs methods				
	Standard sample (1×10^{-3})			
Parameter	*RSD%	RC%	RE%	*Con. found
Direct	2.48	97.32	-2.68	0.9732×10^{-3}
SAM	1.55	97.99	-2.01	0.9799×10^{-3}
MSA	-----	100.04	0.04	1.0004×10^{-3}
TITR	1.31	103.09	3.09	1.0309×10^{-3}
	Standard sample(1×10^{-4})			
Parameter	*RSD%	RC%	RE%	*Con. found
Direct	2.30	98.30	-1.7	0.9830×10^{-4}
SAM	1.76	102.25	2.25	1.0225×10^{-4}
MSA	-----	101.67	1.67	1.0167×10^{-4}
TITR	1.13	102.31	2.31	1.0231×10^{-4}

Table (6): Results of recovery and standard deviation of commercial drugs obtained by using membrane IIIQ.

Pharmaceutical	(KSA)			
Measurement by using ISEs methods				
	Standard sample (1×10^{-3})			
Parameter	*RSD%	RC%	RE%	*Con. found
Direct	0.51	97.51	-2.25	0.9775×10^{-3}
SAM	0.20	97.88	-2.12	0.9788×10^{-3}

MSA	-----	99.21	-0.79	0.9921×10^{-3}
TITR	2.15	102.72	2.72	1.0272×10^{-3}
	Standard sample(1×10^{-4})			
Parameter	*RSD%	RC%	RE%	*Con. found
Direct	2.02	102.21	2.21	1.0221×10^{-4}
SAM	2.11	98.72	-1.28	0.9872×10^{-4}
MSA	-----	101.71	1.71	1.0171×10^{-4}
TITR	3.04	103.41	3.41	1.0341×10^{-4}
Pharmaceutical	(SYRIA)			
Measurement by using ISEs methods				
	Standard sample (1×10^{-3})			
Parameter	*RSD%	RC%	RE%	*Con. found
Direct	1.02	102.93	2.93	1.0293×10^{-3}
SAM	1.09	101.99	1.99	1.0199×10^{-3}
MSA	-----	101.11	1.11	1.0111×10^{-3}
TITR	3.09	103.09	3.09	1.0309×10^{-3}
	Standard sample(1×10^{-4})			
Parameter	*RSD%	RC%	RE%	*Con. found
Direct	0.39	97.94	-2.06	0.9794×10^{-4}
SAM	0.91	98.87	-1.13	0.9887×10^{-4}
MSA	-----	99.30	-0.7	0.9930×10^{-4}
TITR	1.37	102.11	2.11	1.0211×10^{-4}
Pharmaceutical	(UK)			
Measurement by using ISEs methods				
	Standard sample (1×10^{-3})			
Parameter	*RSD%	RC%	RE%	*Con. found
Direct	0.45	97.82	-2.18	0.9782×10^{-3}
SAM	0.55	97.55	-2.45	0.9755×10^{-3}
MSA	-----	99.90	-0.1	0.9990×10^{-3}
TITR	2.33	101.09	1.09	1.0109×10^{-3}
	Standard sample(1×10^{-4})			
Parameter	*RSD%	RC%	RE%	*Con. found
Direct	2.12	98.50	-1.5	0.9850×10^{-4}
SAM	1.22	100.25	0.25	1.0025×10^{-4}
MSA	-----	98.89	-1.11	0.9889×10^{-4}
TITR	2.8	102.67	2.67	1.0267×10^{-4}

Conclusion

The construct ion of molecularly imprinted electrodes sensors (MIP) using Domperidoneas a template and N,Nmethylenebisacrylamide (NMAA) and ethylene glycol dimethacrylate (EGDMA) as cross-linkers and methyl methacrylate (MMA) as monomer in different plasticizers. results of MIP that show high sensitivity, reasonable selectivity, fast static response, long-term stability and applicability over a wide pH range were obtained by using electrode based on DBS and DOPH plasticizers. Good results of recoveries were obtained for the determination of Domperidonein the commercial tablets in comparison with the British Pharmacopoeia.

REFERENCES

I. Al-Bayati, Y. K. & Al-jabari, F. I. (2015). Constraction of new selective electrodes for determination ibuprofen and their application in pharmaceutical samples. *International Journal of Research in Pharmacy and Chemistry*, 5(3), 380-389.

II. Pyka, A., Wiatr, E., Kwiska, K. & Gurak, D. (2011). Validation thin layer chromatography for the determination of domperidone in tablets and comparison with a pharmacopeil method. *Journal Liquid Chromatogrphy Relative Technology*, 34, 829-847.

III. Araujo, L., Villa, N., Camargo, N., Bustos, M., García, T. & de Jesus, P. A. (2011). Environ. Persistence of gemfibrozil, lanso and domp in natural waters, *Environmental Chemistry Letters*, 9, 13-18.

IV. Preinerstorfer, B., Lämmerhofer, M. & Lindner, W. (2009). Advances in enantioselective separations using electromigration capillary techniques. *Electrophoresis*, 30, 100-132.

V. Bally, M., Leung, A., Prosser, K., Walsby, C., Wehbe, M. & Anantha, M. (2018). Metal complexed therapeutic agents and lipid-based nanoparticulate formulations thereof. *Usp To Patent Application*, 16(61), 248-252.

VI. Valsami, G. N. & Macheras, P. E. (1989). Construction of a domperidoneion-selective electrode and its application to pharmaceutical analysis, *Analyst*, 114, 387-391.

VII. Lenik, J., Dumkiewicz, R., Wardak, C. & Marczewska, B. (2002). domperidone ion-selective electrode and its application to pharmaceutical analysis, *Acta Poloniae Pharmaceutical*, 59, 171-176.

VIII. Santini, A. O., Oliveira, J. E., Pezza, H. R. L. & Pezza, B. J. (2006). A novel potentiometric domperidone ion sensor immobilized in a graphite matrix for determination of domperidone in pharmaceuticals. *Chemical Socciety*, 17, 785-791.

IX. Lenik, J., Wardak, C. & Marczewska, B. (2008). Properties of domperidoneion-selective electrodes. *Journal of Chemistry*, 6, 513-519.

X. Lenik, J. (2013). Preparation and study of a domperidoneion-selective electrode. *Materials Science and Engineering*, 33(1), 311-316.

XI. Mousavi, M. P., Ainla, A., Tan, E. K., El-Rahman, M. K. A., Yoshida, Y., Yuan, L. & Homer-Vanniasinkam, S. (2018). Ion sensing with thread-based potentiometric electrodes. *Lab on a Chip*, 18(15), 2279-2290.

XII. Michalska, A. (2012). All solid state ion selective and all solid state reference electrodes. *Electroanalysis*, 24(6), 1253-1265.

XIII. Moody, G. J. & Thomas, J. D. R. (1988). Organic sensor materials in entangled and polymer-bound matrices for ion selective electrodes. *Chemical Sensors*, 75, 116-125.