REVIEW ARTICLE

Synthesis New Liquid Electrodes for Determination Lansoprzole Based on a Molecularly Imprinted Polymer

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ABSTRACT

Liquid electrodes of Lansoprazole (LP) imprinted polymer was synthesis based on precipitation polymerization mechanism. The molecularly imprinted (MIP) and non-imprinted (NIP) polymers were synthesized using LP as a template. By methyl methacrylate (MMA) as a monomer,

Pentaerythritol tetraacrylate (PTA) and ethylene glycol dimethacrylate (EGDMA) as cross-linkers and benzoyl peroxide (BP) as an initiator. The molecularly imprinted membranes were synthesized using Dimethyl adipate (DMA), Dibutyl phthalate (DBPH), Dioctyl phthalate(DOPH), and Nitrobenzene (NB) as plasticizers in PVC matrix. The slopes and limit of detection of liquid electrodes obtained from the calibration curves ranged from (-17.85– -20.89) mV/decade and 1.8 x 10^{-5}–6.0 x 10^{-6} 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 LP without any time-consuming pretreatment measures.

Keywords: Cross-linkers, EGDMA, Lansoprazole, MMA, Molecularly imprinted electrodes, Monomers, PTA.

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INTRODUCTION

Molecularly impressed polymers (MIPs) are a promising solution to tailor-made binding receptor locations by rearranging templates and rearranging functional monomers.[1-4] Functional monomers and crosslinkers 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.[5-6] Lansoprazole (3-methyl-4-(2, 2, 2-trifluoroethoxy)pyridin-2-yl]methylsulfinyl)-1*H*-benzo[d]imidazole, $C_{16}H_{14}F_3N_3O_2S$) Figure 1, occurs as white crystalline powder with molecular weight of 369.4 g/mole.It's odorless and has a bitter taste. It is practically insoluble in water, very slightly soluble in acetonitrile, soluble in ethanol-anhydrous.[7] Lansoprazole, sold under the brand name prevacid among others, is a medication that reduces stomach acid.[8] It is used to treat peptic ulcer disease, gastroesophageal reflux disease, and Zollinger–Ellison syndrome.[9] Effectiveness is similar to other proton pump inhibitors (PPIs).[10] It is taken by mouth.[8] Onset is over a few hours, and effects last up to a couple of days.[8]

Common side effects include constipation, abdominal pain, and nausea.[8] Serious side effects may include osteoporosis, low blood magnesium, *Clostridium difficile* infection, and pneumonia.[8] Use in pregnancy and breastfeeding is of unclear safety.[11] It works by blocking H^+/K^+-ATPase in the parietal cells of the stomach.[1]

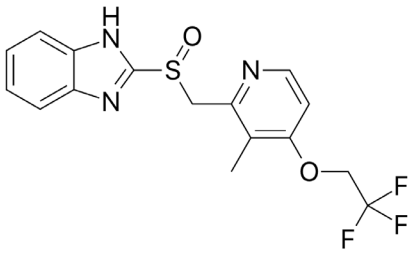

Figure 1: Structure of lansoprazole.

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Lansoprazole was patented in 1984 and came into medical use in 1992.[12] It is available as a generic medication.[9] A month supply in the United Kingdom costs the NHS less than £5 as of 2019.[9] In the United States, the wholesale cost of this amount is about 5.40 USD as of 2019.[13] In 2016 it was the 141st most prescribed medication in the United States with more than 4 million prescriptions.[14]

Lansoprazole-based Polymer electrodes have been prepared as a PVC matrix membrane template, and electrode specifications have been studied in this research.

EXPERIMENTAL

Chemicals

Lansoprazole was obtained from the State Company of Drug Industries and Medical Appliances (IRAQ-Medial East- Baghdad). The commercial lansoprazole degastrol lansoprazole 14 tablets (30 mg), (Tekirdag- Turkey), LANAX Lansoprazole 14 tablets (30 mg) from (Haryana-India), Lansoprazole 7 tablets (30 mg) from (UK– English). Di methyl adiabate (DMA), Dibutyl phthalate (DBPH), Dioctyl phthalate (DOPH), and Nitrobenzene (NO) In addition to metal salts, they were bought from Sigma-Aldrich and used as obtained. methyl methacrylate (MMA) (99%), ethylene glycol dimethacrylate (EGDMA) (99%), pentaerythritol tetraacrylate (PTA), 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 and 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 and Sohn GmbH, Germany. The performance of the electrode was investigated by measuring the potential of lansoprazole solutions at room temperature with concentrations range from10^{-2} to 10^{-6} M. For the accuracy, the potential of solutions was measured after the arrival of the internal and external solution to the equilibrium, then the potential recorded.

Synthesis of the Imprinted Polymer (MIP)

The method of bulk polymerization was used to prepare MIP. The 1 mmol model (LP) was placed in a dense walled glass tube filled with 10 mL ethanol anhydrous (50 mL capacity). The monomer has been used to prepare MIP, 0.011 mmole of methyl methacrilate (MMA) with 0.11 mmole Pentaerythritol tetraacrylate (PTA) as a cross-linker, the second MIP based on 4mmol of methyl methacrylate (MMA) monomer 20 mmol ethylene glycol dimethacrylate (EGDMA) as cross-linker. The initiator of 0.05 mmole BP was used. The solution was mixed in the ultrasonic water bath for a period of 45 minutes. The nitrogen gas was purified during this time... After 15 minutes seal the tube and put the tube in 55°C water bath to permit starting the reaction which continued for 1 hour through the use of soxhlet extraction, templates were removed by repeated

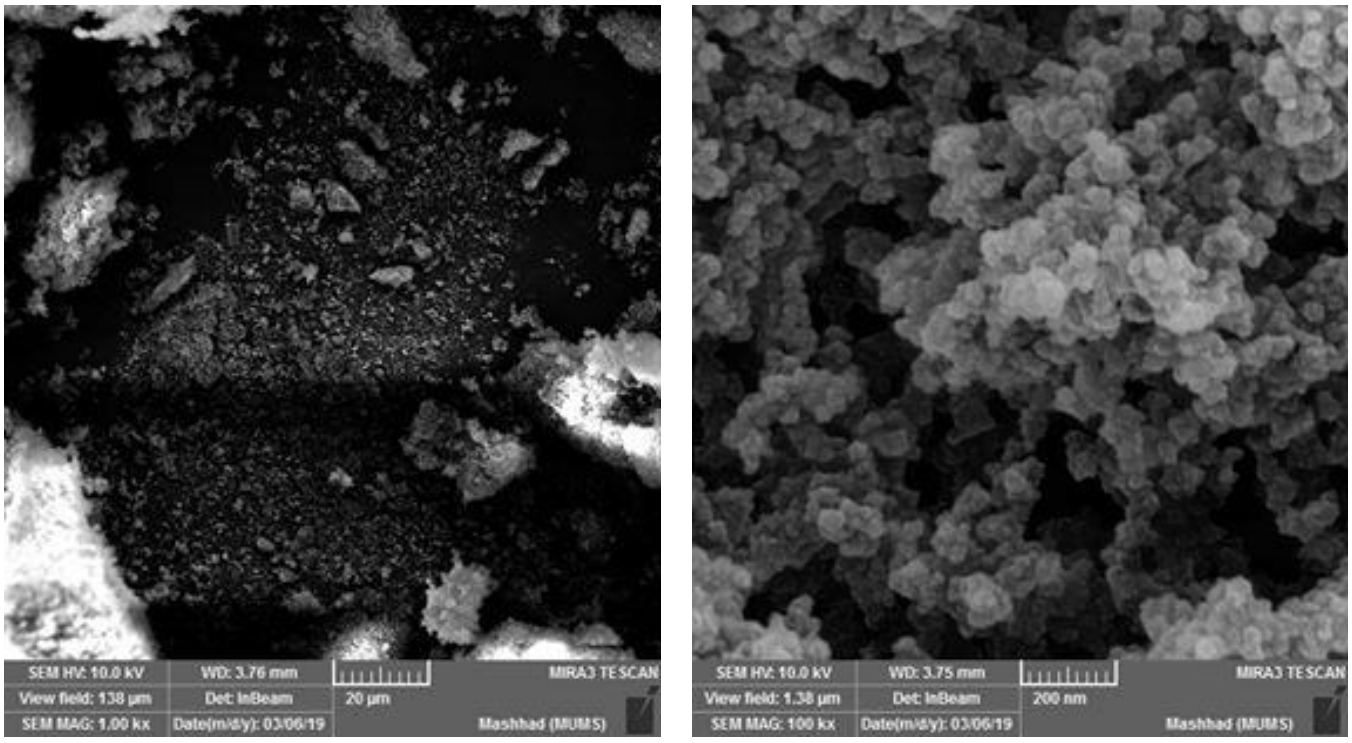

Figure 2: SEM photograph of the surface of MIP_1, a) before washing b) after washing

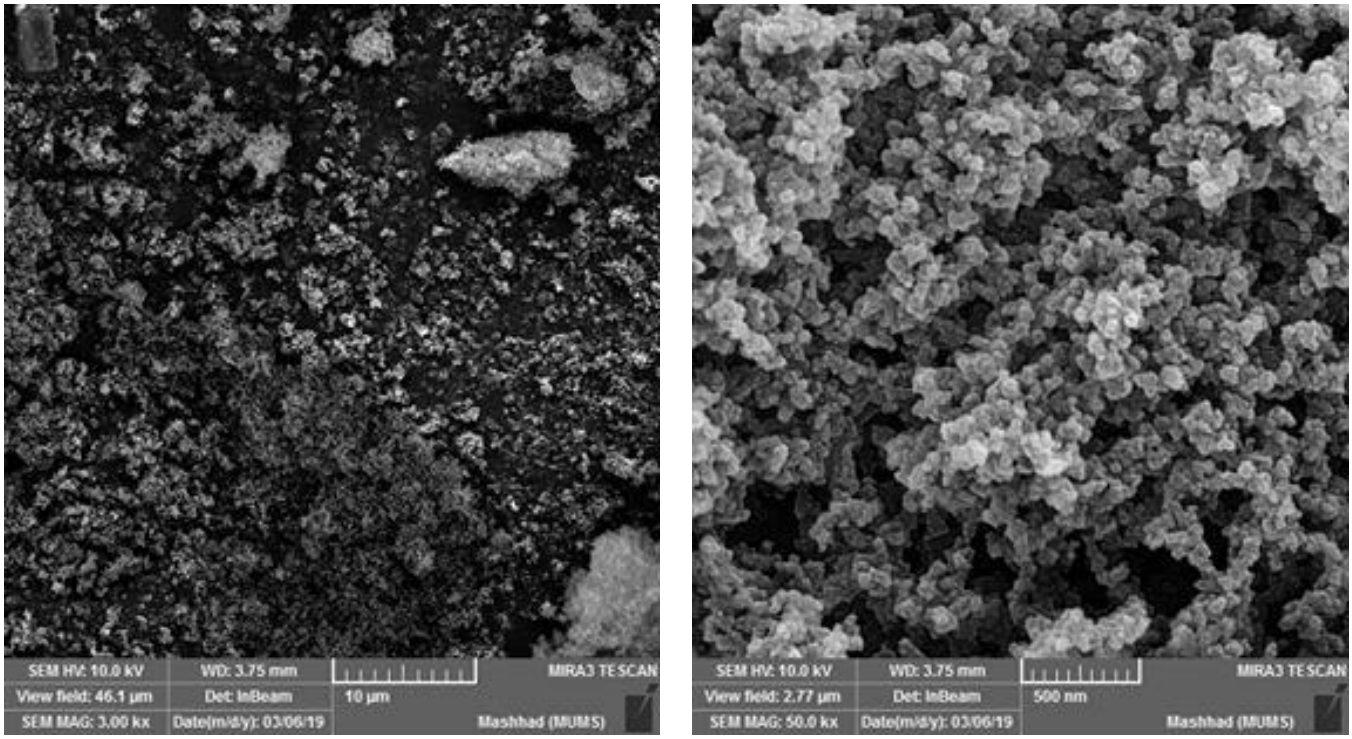

Figure 3: SEM photograph of the surface of MIP_2, a) before washing b) after washing

cleaning the MIPs with 100 mL parts of 30 percent (v/v) acetic acid/methanol solution. The paper was washed for 24–48 hours at 35–45°C, the polymers were then crushed and ground using mortar and pestle, and 125 µm of particle size was sieved (using 100 mesh sieves).); it was used as active material in the selective sensor membrane after the polymer had been completely dried at ambient temperature. The unprinted polymer NIP was produced in the same manner, but without the drug for the 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, a scanning electron microscope (SEM) has been used. Figure 2 shows the morphology of MIP and NIP membranes for Lansoprazole before and after washing. The binding sides to the polymer may be indicated by a porous surface (Figure 2a) about 1 mm. Figure 2b suggests clear holes that were collected in dimensions of around 50 µm and removed through soxhlet extraction.

Potential Measurements

Measurements were carried out in a 50 mL double-walled glass cell; magnetic stirring was used to 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 for dissolved pharmaceutical samples and completed for more than 30 minutes in the volumetric flask of methanol and using the magnetic agitator. The solution was then filtered using 0.07µm cellulose filter paper to repare and obtained lansoprazole concentrations of 1 x10^{-3} M and 1 x 10^{-4} M.

RESULTS AND DISCUSSION

Liquid Membranes Electrode

MIP based liquid electrodes, their concentrations range, and slopes response to the Nernstian equation has been investigated. The membranes of MIP made of the monomers MMA with a PVC matrix using two plasticizers DBPH and DMA. The internal solution was used 0.01M aqueous standard solution of a drug for all liquid electrodes. Experimental results of the synthesis of molecularly imprinted (MIP) and non-imprinted polymers (NIP) based on monomer MMA and crosslinker (PTA).The plasticizer is an essential part of the sensing membrane, which has an important role as a solvent for the different components and determines the mobility of

Table 3: Parameter of PZD-MIP electrodes based on different plasticizers

		Parameter				
Electrode No.	*Membrane composition*	*Slope mV/decade*	*Correlation Coefficient(r)*	*Linearity range/M*	*Detection limit/M*	*Life time/day*
IQ	LP-MIP1(MMA + PTA + DBPH)	-19.9531	0.9978	(1×10^{-4}-1×10^{-2})	4×10^{-4}	25
IIQ	LP-MIP1(MMA+ PTA +DMA)	-20.8974	0.9889	(1×10^{-4}-5×10^{-3})	1×10^{-5}	23
IIIQ	LP-MIP2(MMA+EGDMA + NB)	-17.8574	0.9981	(1×10^{-4}-1×10^{-2})	6×10^{-5}	15
IIVQ	LP-MIP2(MMA+EGDMA + DOPH)	-19.1195	0.9799	(1×10^{-4}-5×10^{-3})	2×10^{-5}	23

the analyte in the membrane. Both of the plasticizers that are used, DBPH and DMA, are suitable for the fabrication of MIP-based LP electrodes. Table 3 shows the parameters of the fabricated and tested electrodes; four membranes of the different compositions were prepared using two different plasticizers with different viscosities, dibutylphalate (DBPH) (v=11.0042cSt) and dimethyl adiabate (DMA)(v = 2.030cSt). Electrode specification findings were acquired from the calibration curves mentioned in Table 3.

The slopes of the electrodes ranged between -17.85—20.89 mV/decade and linear dynamic ranges between $3.0x10^{-5}$- $6.0 x10^{-6}$ M. In general, the preparation electrodes have a short response time (about 60 seconds) mostly at high concentrations. The values listed in Table 3 also indicate the electrodes IIQ and IVQ give good results; therefore, the liquid electrode was used to determine both drugs in pharmaceutical samples.

Influence of pH

The impact of pH 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 4 and the typical plot of electrode potential versus pH for electrode IIQ and IVQ are shown in Figure 3.

CONCENTRATIONS

Response time and lifetime

The response time for all LP.MIP electrodes was obtained from the dynamic potential response at a 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 Lansoprazole at high concentration 10^{-2} M and about 59 seconds at low concentration 10^{-5} M. The electrode lifetime was obtained by measuring the slope periodically from calibration curves for LP.MIP during 17-32 days, as shown in Table 5.

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 the basis upon layers of electrical diffuse on both sides (the aqueous and the membrane of the interface), so it does not depend on the 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 concentrations of the primary and

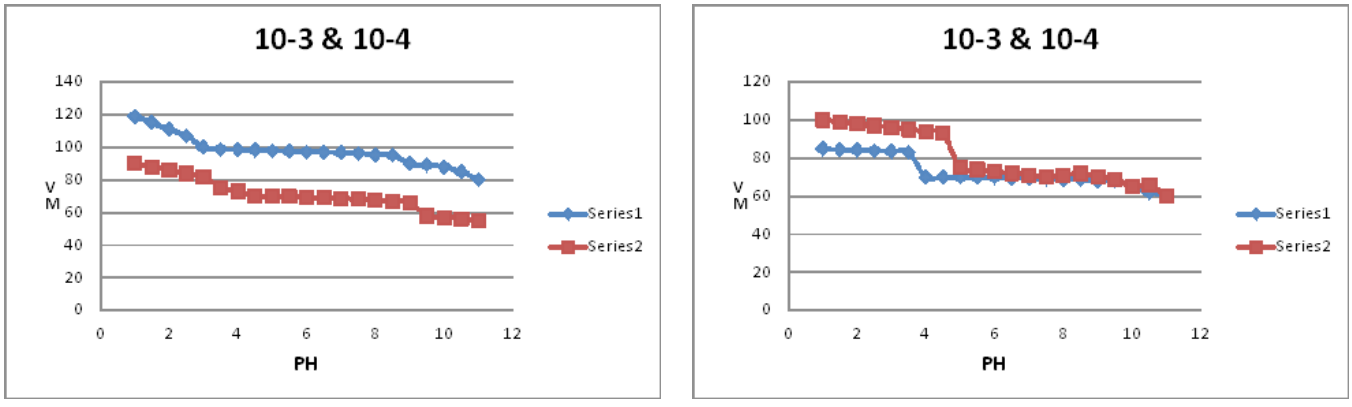

Figure 3: Typical plot of electrode response versus pH of LP-MIP electrodes at different

Table 4: Working pH ranges for LP-MIP electrode

		pH range	
Electrode No.	*Membrane composition*	*$1x10^{-3}$*	*$1x10^{-4}$*
IQ	LP-MIP1 + DBPH	3.0-7.0	3.5-8.5
IIQ	LP-MIP1 + DMA	3.0-8.5	4.5-7.5
IIIQ	LP-MIP2 +NB	3.5-8.5	4.0-8.5
IVQ	LP-MIP2 +DOPH	4.0-9.5	5.0-8.5

Table 5: Response time of Lansoprazole electrode

Membrane	*Conce. (M)*	*(mV) at t/100*	*Time (s) at 95%*	*Time (s) at 100%*
LP-MIP1 + DBPH (IQ)	1×10^{-2}	3.6	48	50.5
	5×10^{-3}	1.6	50	52.6
	1×10^{-3}	4.7	58	61
	5×10^{-4}	6.9	49	51.5
	1×10^{-4}	4.2	30.3	31.8
	5×10^{-5}	4.3	55	57.8
LP-MIP1 + DMA (IIQ)	1×10^{-2}	77	57	60
	5×10^{-3}	99	54	56
	1×10^{-3}	128	50.1	52.6
	5×10^{-4}	137	50.7	53.3
	1×10^{-4}	140	55	57.8
	5×10^{-5}	138	131.1	60
LP-MIP2 + NB (IIIQ)	1×10^{-2}	45	50	52.6
	5×10^{-3}	41	50.8	53.4
	1×10^{-3}	56	50.5	53.1
	5×10^{-4}	55	50.6	53.2
	1×10^{-4}	49	50.4	53
	5×10^{-5}	40	50.8	53.4
LP-MIP2 + DOPH (IVQ)	1×10^{-2}	12	50.5	53.1
	5×10^{-3}	11	50.7	53.3
	1×10^{-3}	13	50.4	52.6
	5×10^{-4}	18	50.4	53
	1×10^{-4}	18	50.3	53
	5×10^{-5}	23	50.6	53.2

interfering ions within aqueous solutions at which as much as the permeability of the primary and interfering ions which pass through the membrane surface selectively. The selectivity coefficients of unequal charged ions (i.e., ZA≠ZB) that are not only represented the primary and interfering ions amounts which permeated through the surface of the membrane (as a function) but they 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 Figure 4 and in Tables 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 an increase in the concentration of primary ion.

Quantitative analysis

The accuracy of electrodes IIQ and IVQ were measured by determining Lansoprazole in synthetic solutions of 1×10^{-3} and1×10^{-4} M using the standard addition method. Excellent results of % recovery were obtained in the range 94.95 to 105.6. A typical plot for membrane IIQ and IVQ at a concentration of synthetic solution($1\times10^{-3,}$ 1×10^{-4})M is shown in Figures. (5, 6) and the standard solution added was 0.01 M.

Applications of pharmaceuticals

Ion-selective electrodes that based on molecularly imprinted polymers were used for the determination of Lansoprazole in pharmaceuticals. These ISEs measurements, including standard addition, direct, Gran plot, and multiple standard addition method. Preparation solutions of lansoprazole at concentrations 1×10^{-3} and 1×10^{-4} M. using membrane IIQ based on DMA and IVQ based on DOPH as a plasticizer. The RE%, RC%, and RSD% were calculated of lansoprazole

Table 6: Result of coefficients of selectivity using distinct solution technique for some interfering species (cations and amino acids)

Membrane composition	*Interfering-Ion(1×10^{-3} M)*	*KMPM ΔE = 10*	*KMPM ΔE = 5*
LP-MIP1 + DBPH	K^{+1}	0.0063	0.6309
	Ca^{2+}	0.1701	0.5994
	Al^{3+}	0.0562	0.5994
Membrane composition	*Interfering-Ion(1×10^{-3} M)*	*KMPM ΔE = 10*	*KMPM ΔE = 5*
LP-MIP1+ DMA	K^{1+}	0.0421	0.0185
	Ca^{2+}	0.0350	0.0262
	Al^{3+}	0.0437	0.0294
Membrane composition	*Interfering-Ion(1×10^{-3} M)*	*KMPM ΔE = 10*	*KMPM ΔE = 5*
LP-MIP2 + NB	K^{1+}	0.3150	0.1250
	Ca^{2+}	0.3522	0.1621
	Al^{3+}	0.3011	0.1272
Membrane composition	*Interfering-Ion(1×10^{-3} M)*	*KMPM ΔE = 10*	*KMPM ΔE = 5*
LP-MIP2 + DOPH	K^{1+}	0.0789	0.2727
	Ca^{2+}	0.0369	0.1183
	Al^{3+}	0.0384	0.1318

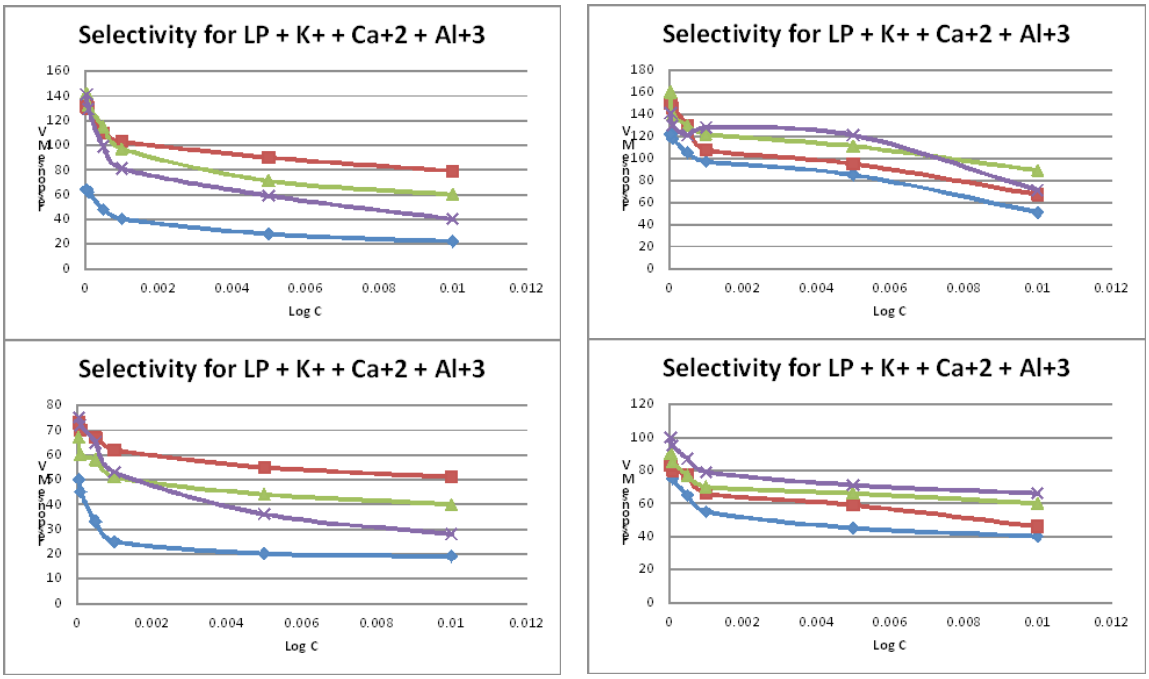

Figure 10: Result of coefficients of selectivity using distinct solution technique for some interfering species (cations and amino acids)

Table 7: Results of recovery and standard deviation of commercial drugs obtained by using membrane IIQ.

Electrode No. 2	*Concentrations (M)*			
		Measurements using potentiometric methods		
	Sample	*Direct*	*SAM*	*MSA*
LP - MIP_1+ DMA	1×10^{-3}	1.0010×10^{-3}	1.0154×10^{-3}	1.0056×10^{-3}
	*RSD%	0.69	1.65	----------
	RC%	100.10	101.54	100.56
	RE%	0.10	1.54	0.56
	1×10^{-4}	1.0001×10^{-4}	1.0059×10^{-4}	1.0024×10^{-4}
	*RSD%	1.53	1.15	----------
	RC%	100.01	100.59	100.24
	RE%	0.01	0.59	0.24

	(India)			
Pharmaceutical	*Direct method*	*SAM*	*MSA*	*Titration method*
Concentration prepared	1×10^{-3}	1×10^{-3}	1×10^{-3}	1×10^{-3}
*Found	1.0021×10^{-3}	1.0072×10^{-3}	1.0027×10^{-3}	1.0063×10^{-3}
RC%	100.21	100.72	100.27	100.63
RE%	0.21	0.72	0.27	0.63
*RSD%	0.95	1.02	-------	1.31
(India)	Direct method	SAM	MSA	Titration method
Concentration prepared	1×10^{-4}	1×10^{-4}	1×10^{-4}	1×10^{-4}
*Found	0.9992×10^{-4}	1.009×10^{-4}	1.0094×10^{-4}	1.0250×10^{-4}
RC%	99.92	100.9	100.94	102.50
RE%	-0.08	0.9	0.94	2.50
*RSD%	1.35	1.02	-------	1.04

	turkey			
Pharmaceutical	*Direct method*	*SAM*	*MSA*	*Titration method*
Concentration prepared	1×10^{-3}	1×10^{-3}	1×10^{-3}	1×10^{-3}
*Found	1.010×10^{-3}	1.0085×10^{-3}	1.0041×10^{-3}	1.03237×10^{-3}
RC%	101	100.85	100.41	103.23
RE%	1	0.85	0.41	3.23
*RSD%	1.58	1.55	-------	1.30

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Contt...

	(turkey)			
Pharmaceutical	*Direct method*	*SAM*	*MSA*	*Titration method*
Concentration prepared	1×10^{-4}	1×10^{-4}	1×10^{-4}	1×10^{-4}
*Found	1.0384×10^{-4}	1.0234×10^{-4}	1.00041×10^{-4}	1.0272×10^{-4}
RC%	103.84	102.34	100.04	102.72
RE%	3.84	2.34	0.04	2.72
*RSD%	1.45	1.20	-------	1.40
(UK)	Direct method	SAM	MSA	Titration method
Concentration prepared	1×10^{-3}	1×10^{-3}	1×10^{-3}	1×10^{-3}
*Found	0.9922×10^{-3}	1.0055×10^{-3}	1.0004×10^{-3}	1.0120×10^{-3}
RC%	99.22	100.55	100.04	101.20
RE%	-0.78	0.55	0.04	1.20
*RSD%	1.2	0.56	-------	1.04

	UK			
Pharmaceutical	*Direct method*	*SAM*	*MSA*	*Titration method*
Concentration prepared	1×10^{-4}	1×10^{-4}	1×10^{-4}	1×10^{-4}
*Found	1.0015×10^{-4}	0.9891×10^{-4}	1.015×10^{-4}	1.04431×10^{-4}
RC%	100.15	98.91	101.5	104.43
RE%	0.15	-90.109	0.5	4.43
*RSD%	1.59	1.1	-------	1.4

	Concentrations (M)			
		Measurements using potentiometric methods		
Electrode No. 4	*Sample*	*Direct*	*SAM*	*MSA*
LP – MIP_2+ DOPH	1×10^{-3}	1.0170×10^{-3}	1.0111×10^{-3}	1.0102×10^{-3}
	*RSD%	0.68	0.55	----------
	RC%	101.70	101.11	101.02
	RE%	1.70	1.11	1.02
	1×10^{-4}	1.0201×10^{-4}	1.0118×10^{-4}	1.0050×10^{-4}
	*RSD%	1.50	2.20	----------
	RC%	102.01	101.18	100.50
	RE%	2.01	1.18	0.50

Table 8: Results of recovery and standard deviation of commercial drugs obtained by using membrane IVQ.

	(India)			
Pharmaceutical	*Direct method*	*SAM*	*MSA*	*Titration method*
Concentration prepared	1×10^{-3}	1×10^{-3}	1×10^{-3}	1×10^{-3}
*Found	1.0174×10^{-3}	1.0195×10^{-3}	1.0172×10^{-3}	1.0232×10^{-3}
RC%	101.74	101.95	101.72	102.32
RE%	1.74	1.95	1.72	2.32
*RSD%	1.75	1.25	-------	1.02
(India)	Direct method	SAM	MSA	Titration method
Concentration prepared	1×10^{-4}	1×10^{-4}	1×10^{-4}	1×10^{-4}
*Found	0.9922×10^{-4}	1.019×10^{-4}	1.0100×10^{-4}	1.0360×10^{-4}
RC%	99.22	101.9	101	103.6
RE%	-0.78	1.9	1	3.6
*RSD%	2	1.09	-------	2.01

	turkey			
Pharmaceutical	*Direct method*	*SAM*	*MSA*	*Titration method*
Concentration prepared	1×10^{-3}	1×10^{-3}	1×10^{-3}	1×10^{-3}
*Found	1.030×10^{-3}	1.0285×10^{-3}	1.0144×10^{-3}	1.04231×10^{-3}
RC%	103	102.85	101.44	104. 2
RE%	3	2.85	1.44	4. 2
*RSD%	1.01	1.02	-------	1.04

Contt...

Contt...

	(turkey)			
Pharmaceutical	*Direct method*	*SAM*	*MSA*	*Titration method*
Concentration prepared	1×10^{-4}	1×10^{-4}	1×10^{-4}	1×10^{-4}
*Found	1.0390×10^{-4}	1.0266×10^{-4}	1.0241×10^{-4}	1.0344×10^{-4}
RC%	103.90	102.66	102.41	103.44
RE%	3.90	2.66	2.41	3.44
*RSD%	1.09	1.06	-------	2.4
(UK)	Direct method	SAM	MSA	Titration method
Concentration prepared	1×10^{-3}	1×10^{-3}	1×10^{-3}	1×10^{-3}
*Found	1.0102×10^{-3}	1.0075×10^{-3}	1.0055×10^{-3}	1.0360×10^{-3}
RC%	101.02	100.75	100.55	103.6
RE%	1.02	0.75	0.55	3.6
*RSD%	1.08	1.76	-------	1.04

	UK			
Pharmaceutical	*Direct method*	*SAM*	*MSA*	*Titration method*
Concentration prepared	1×10^{-4}	1×10^{-4}	1×10^{-4}	1×10^{-4}
*Found	0.1015×10^{-4}	1.0123×10^{-4}	1.0026×10^{-4}	1.02231×10^{-4}
RC%	101. 5	101.2	100.26	102.2
RE%	1. 5	1.2	0.26	2.2
*RSD%	1.04	2.2	-------	1.76

in pharmaceuticals. The results obtained represented in the Table 6.

CONCLUSION

The construction of molecularly imprinted electrodes sensors (MIP) using Lansoprazole as a template and pentaerythritol triacrylate (PTA) and ethylene glycol dimethacrylate (EGDMA) as cross-linkers and methyl methacrylate(MMA) as a 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 DMA and DOPH plasticizers. Good results of recoveries were obtained for the determination of Lansoprazole in the commercial tablets in comparison with the British Pharmacopoeia.

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