

**PVC****Dibenzo-18-Crown-6**

/ /

**(NJC)****(2005/ 6 /22 )****(2004/ 12 / 7 )**

PVC DB18C6 (Pd<sup>2+</sup>)  
 (Di-n-Octyl Phenyl Phthalate) (DOPP)

,  
 / (1x10<sup>-3</sup> - 1x10<sup>-6</sup>) (Pd (II))

(0.9998)

1.5 x 10<sup>-7</sup> 2% RSD% 2% (26.7 mV/decade)

. /

,  
 K<sub>ij</sub><sup>pot</sup>

(25 sec) (11-7) pH

. (11) (30)

**Abstract**

A palladium (II) ion- selective electrode was prepared; depend on the active material DB18C6 as a sensor, deposited in PVC polymer, by use a (DOPP) as a plastizier substance, in the membrane.

The behavior and characteristics properties of this electrode have been studied.

It respond for the concentration range (1x10<sup>-6</sup>-1x10<sup>-3</sup>) mol/ L of palladium, with a relative standard error of about 2% and a relative standard deviation of 1-2 %.

The nernst linearity slop is equal to 26.7 mV/decade with detection limit of 1.5 x 10<sup>-7</sup> mol/ L, and correlation coefficient of about (0.9998).

The selectivity coefficient K<sub>ij</sub><sup>pot</sup> of it is electrode was calculated, in the presence of some interferences cations and anion with certain Pd (II) solutions.

It was found that range of pH response is (7-11), with response time of 25 sec. at 303 K, the electrode lifetime was found to be 11 days.



(1)

50/	/	
1.1520	0.1	Pd(NO <sub>3</sub> ) <sub>2</sub>
1.0597	0.5	LiCl
1.4500	0.5	NaCl
1.8500	0.5	KCl
3.0200	0.5	RbCl
2.3500	0.5	MgCl <sub>2</sub>
2.7500	0.5	CaCl <sub>2</sub>
3.9250	0.5	SrCl <sub>2</sub>
5.1750	0.5	BaCl <sub>2</sub>
3.2000	0.5	NiCl <sub>2</sub>
3.3250	0.5	CuCl <sub>2</sub>
4.5500	0.5	CdCl <sub>2</sub>
4.0200	0.5	FeCl <sub>3</sub>
3.2975	0.5	AlCl <sub>3</sub>
3.3500	0.5	Na <sub>2</sub> (COO) <sub>2</sub>
1.0450	0.5	NaF
3.0750	0.5	Na <sub>2</sub> SO <sub>3</sub>
2.9725	0.5	NaHPO <sub>4</sub>
2.1000	0.5	NaHCO <sub>3</sub>
1.4500	0.5	NaCl
2.1250	0.5	NaNO <sub>3</sub>

(72)

(6-8)

( ) (12) (Mixed Method) 0.005  
 ( ) 0.003 (DB18C6)  
 0.25 (DOPP)  
 0.17 (PVC)  
 (THF)  
 (25) (8-7)

Cork

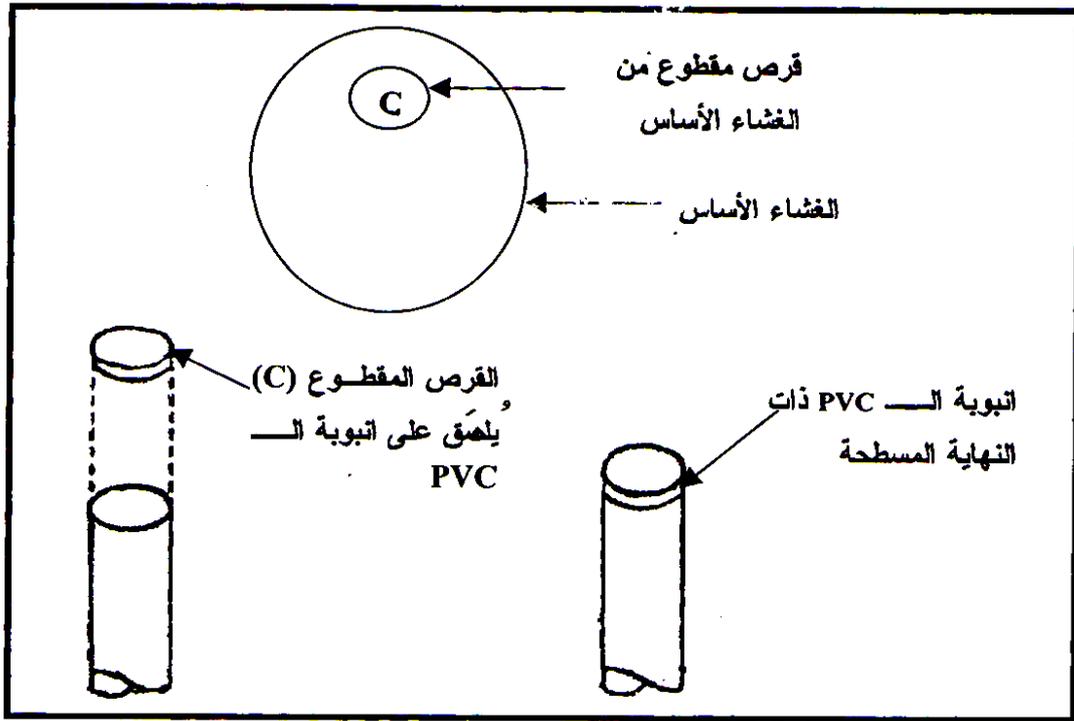
Borer . / (0.01)

PVC PVC

Ag/AgCl THF

PVC

(1) Disc

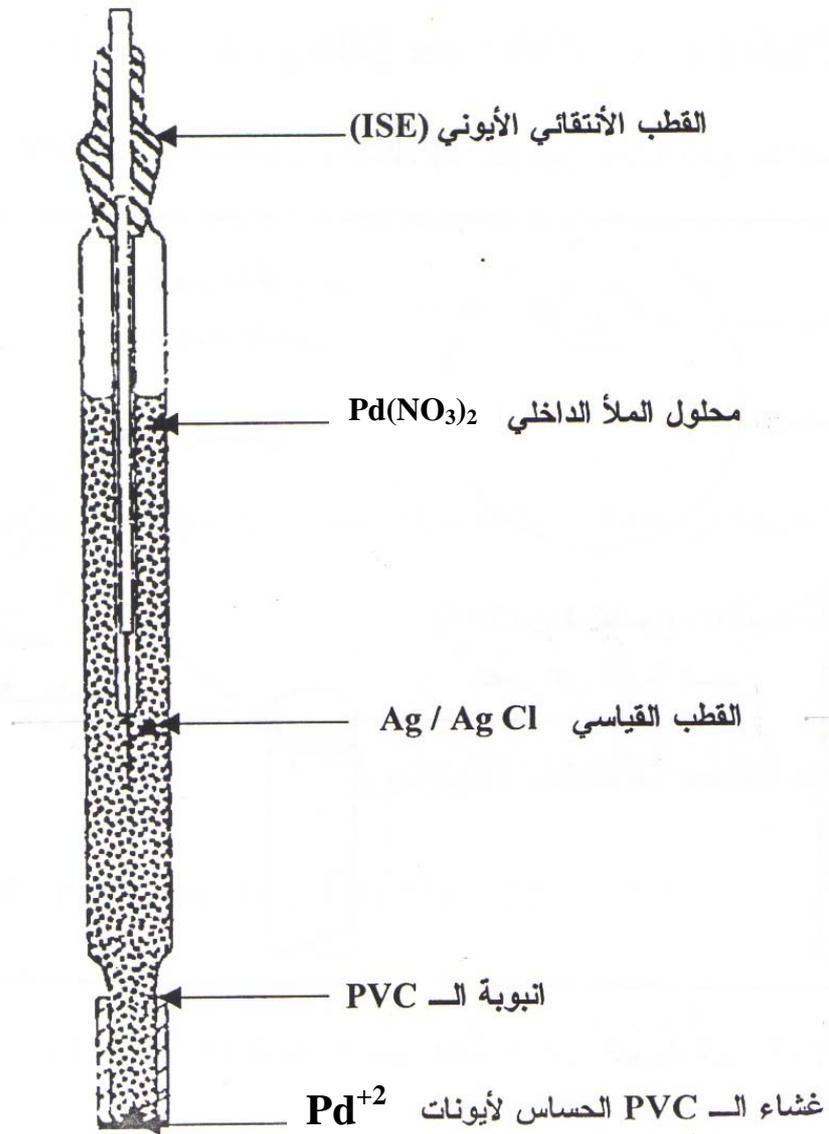


شكل (1) : طريقة تركيب الغشاء على أنبوبة الـ PVC

(2)

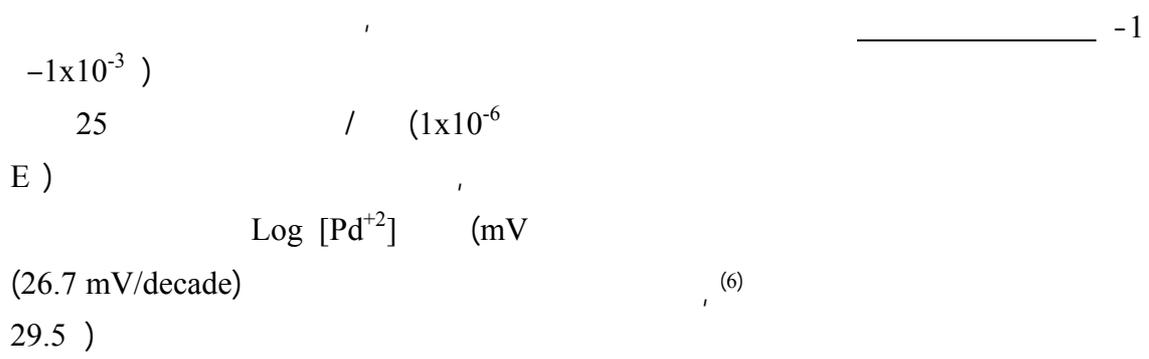
(9)

( ) / (0.01)

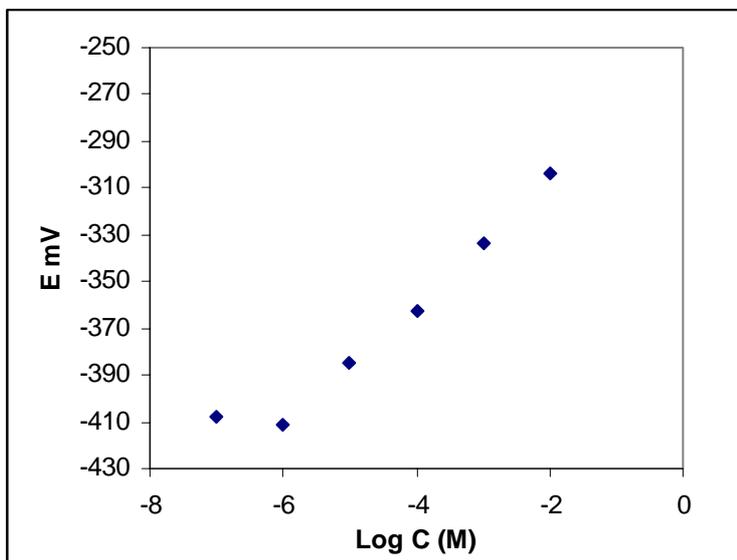


(Pd<sup>2+</sup>)

(2)



$$\begin{aligned}
 & ) \quad \text{(mv/decade)} \\
 & \text{IUPAC} \quad / \quad (1.5 \times 10^{-7}) \\
 & ) \\
 & (3) \quad {}^{(10)}(\Delta E = 18/Z_i)
 \end{aligned}$$



(3)

mV/decade 26.7

$1 \times 10^{-3}$ , )

/  $(1 \times 10^{-4})$

$\text{Pd}(\text{NO}_3)_2$

\_\_\_\_\_ -2

, /  $(1 \times 10^{-4} - 1 \times 10^{-2})$

$\text{Pd}(\text{NO}_3)_2$  (2)

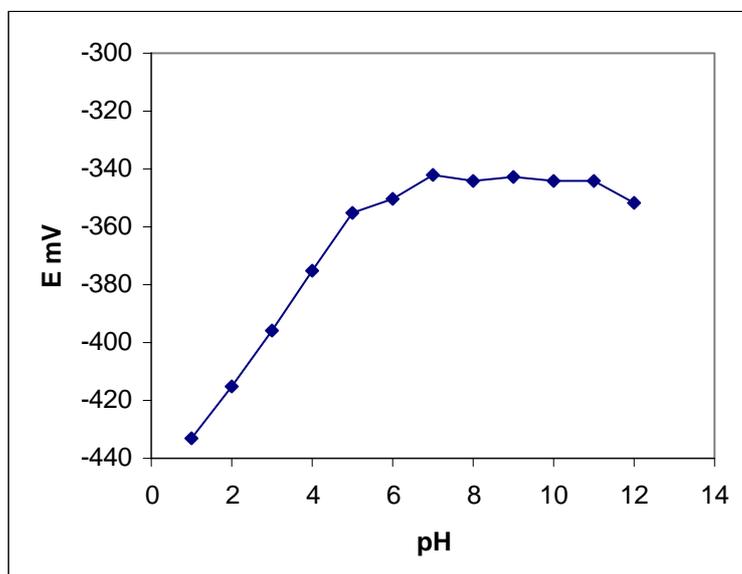
(2)

/  $(1 \times 10^{-2})$

(2)

C mol/L	E mV		
	$10^{-2}$	$10^{-3}$	$10^{-4}$
$10^{-2}$	-304	-224	-251
$10^{-3}$	-334	-240	-242
$10^{-4}$	-363	-251	-239
$10^{-5}$	-385	-267	-228
$10^{-6}$	-411	-276	-224
$10^{-7}$	-388	-264	-206

(11-7) \_\_\_\_\_ -3  
 (7) (11) pH (4) pH  
 $H_3O^+$  (11) pH  
 ( $Pd^{+2}$ ) NaOH HCl  
 (7) pH



(4)

(3) \_\_\_\_\_ -4  
 ( $Pd^{+2}$ ) Selectivity Coefficient

$$\frac{a_{(j)}}{a_{(i)}} = K_{ij}^{pot} \quad (3)$$

$$\frac{1}{(0.1)}$$

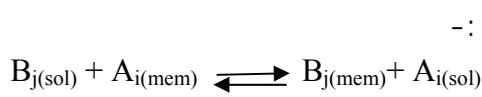
$$\frac{1}{(1 \times 10^{-4})} \text{Pd}^{2+}$$

$$K_{ij}^{pot}$$

$$K_{ij}^{pot}$$

$$\frac{a_{(j)}}{a_{(i)}}$$

$$(\text{Pd}^{+2})$$



$$K_{ij}^{pot} \quad (11)$$

$$K_{ij}^{pot} = \frac{a_i \cdot 10^{(E_{ij} - E_i) / s} \cdot a_i}{a_j^{z_i / z_j}}$$

$A_i$

$B_j$

$$1 > K_{A_i, B_j}^{pot}$$

(i)

( $E_{ij}$ )

$B_i$

(j)

$$K_{A_i, B_j}^{pot}$$

(i)

( $E_i$ )

(11)

$$(a_{B_j} / a_{A_i})$$

(j)

(j)

(i)

( $a_i$ )

(j)

( $a_j$ )

(i)

(3)

Ions	$K_{i,j}^{pot} \times 10^{-6}$
Li <sup>+</sup>	-2.70
Na <sup>+</sup>	-5.50
K <sup>+</sup>	-2.70
Rb <sup>+</sup>	-2.70
Mg <sup>+2</sup>	-9.50
Ca <sup>+2</sup>	-9.50
Sr <sup>+2</sup>	-9.50
Ba <sup>+2</sup>	-7.00
Ni <sup>+2</sup>	-7.50
Cu <sup>+2</sup>	-6.00
Cd <sup>+2</sup>	-5.00
Fe <sup>+3</sup>	-16.80
Al <sup>+3</sup>	-17.80
(COO) <sub>2</sub> <sup>-2</sup>	-2.85
F <sup>-</sup>	-9.99
SO <sub>3</sub> <sup>-2</sup>	-2.85
HPO <sub>4</sub> <sup>-</sup>	-9.99
HCO <sub>3</sub> <sup>-</sup>	-9.99
Cl <sup>-</sup>	-9.99
NO <sub>3</sub> <sup>-</sup>	-9.99

(4)

,(Pd<sup>+2</sup>)

(4)

RE %	RSD %	I		
		(12)		
2.50	3.34	1.13 x10 <sup>-3</sup>	1.42 x10 <sup>-3</sup>	1.50 x10 <sup>-3</sup>
1.98	2.01	1.80 x10 <sup>-4</sup>	2.03 x10 <sup>-4</sup>	2.3 x10 <sup>-4</sup>

### References

- 1- G.A.Rechnitz, *Anal.Chem.*, 1972, **44**, 370.
- 2- K.J.Petrane & O.Eybo, *Anal.Chem.Acta*, 1974, **72**, 375.

- 3- L.K.Shpigum, E.A. Novikov & Yu.A. Zolotov, *Anal.Khim.*, 1986, **44**, 61.
- 4- S.Y.Kamata & K.Yamasak, *Analyst*, 1988, **113**, 45.
- 5- L.K.Shpigun, *Reviews on analytical chemistry* ( D.Littlejohn and D.Thorburn Burns) P.246-272. Royal Society of Chemistry, United Kingdom (1994).
- 6- Z.M.AL-Mosawy, *M.SC. Thesis*, Babylon University,(2002).
- 7- T.S.Donald, R.H.William & M.B.Janice, *Chemical Experiments for Instrumental Method*, Wiley, New York, (1969), p 412.
- 8- A.Graggs, G.J.Moody, J.D.R..Tomas, *J.Chem.Educ.*, 1974, **5**, 54.
- 9- G.J.Moody & J.D.R.Thami, *Talanta*, 1972, **19**, 623
- 10- P.L.Bailey, *Analysis with Ion Selective Electrodes*, Heyden and Sons.Ltd.,(1976)p.36.
- 11- P.Buhlmann & Y.Umezaawa, *Electroanalysis*, 1999, **11**, 687
- 12- M.Zenko, *Separation and Spectrophotometric Determination of Elements*, John Wily and Sons., Int., (1976), p.413.