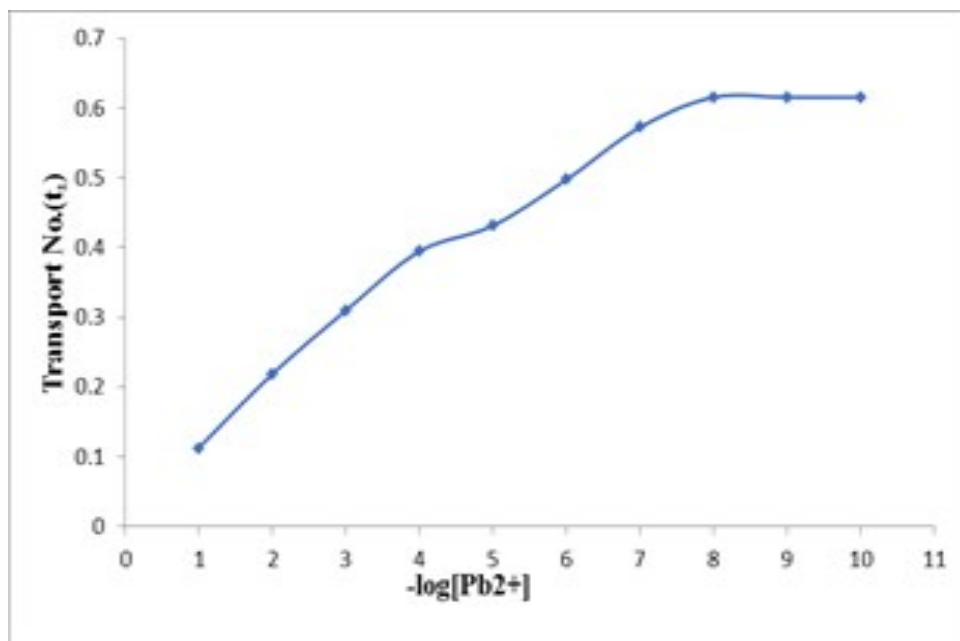
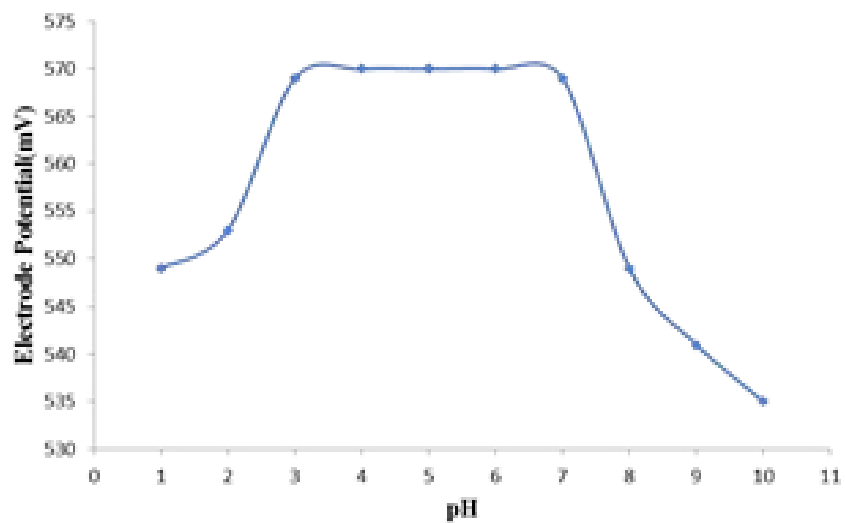


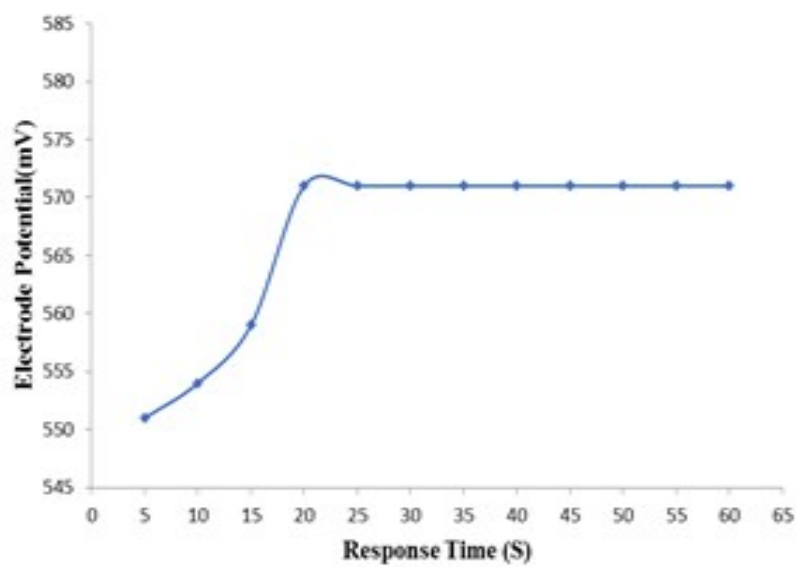
**Fig S1.** Calibration curve of Pcz-SnAT composite membrane electrode in  $\text{Pb}(\text{NO}_3)_2$  with Nerstian value of linear working range of calibration plot



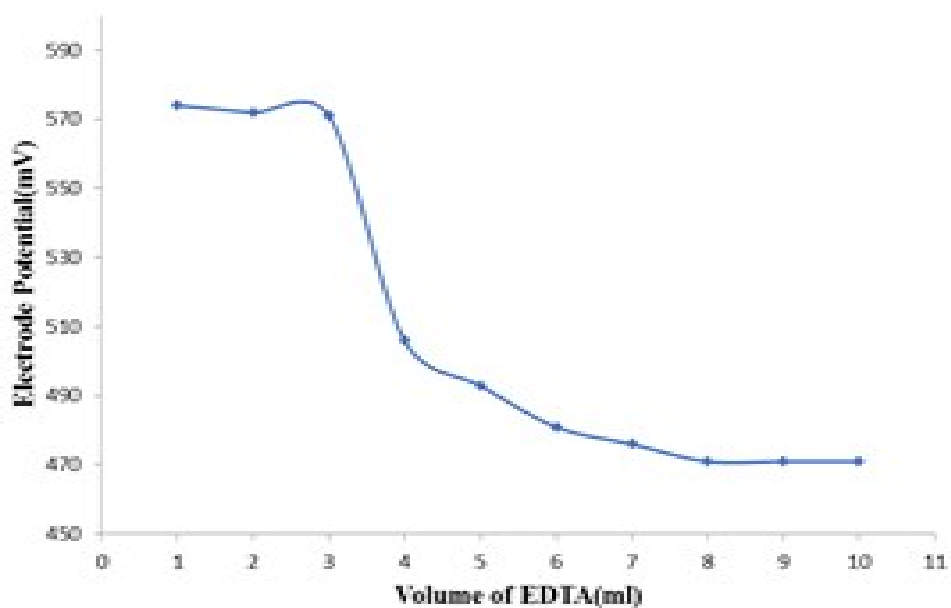
**Fig S2.** Graph of fabricated composite membrane electrode in  $\text{Pb}(\text{NO}_3)_2$  solution for transport no.



**Fig S3.** Effect of pH on the potential response of the Pcz-SnAT composite ion exchange membrane electrode



**Fig S4.** Time response graph of composite electrode of IEM at  $1 \times 10^{-1}$  mol/L  $[Pb^{2+}]$ .



**Fig S5.** The titration of Pcz-SnAT composite electrode of IEM at  $1 \times 10^{-2}$  mol/L  $[Pb^{2+}]$ .

**Table S1** Synthesis and IEC of Sn(IV) arsenotungstate IEM

S. No.	0.1 mol/L Stannic chloride 1 mol/L HCl/mL	0.1 mol/L Sodium tungstate DMW/mL	0.1 mol/L Sodium arsenate DMW/mL	pH	IEC Meqg <sup>-1</sup>
S-1	50	50	50	1	2.0
S-2	100	50	50	1	2.1
S-3	50	100	50	1	1.4
S-4	50	50	100	1	0.8

**Table S2** Preparation, IEC of Pcz-SnAT nanocomposite cation exchanger

S.No.	Sn(IV)arsenotungstate Inorganic ion exchanger (chloroform) (gm)	Carbazol (chloroform) (gm)	FeCl <sub>3</sub> (chloroform) (gm)	IEC meq/gm
P1	0.5	5	5	1.30
P2	1	5	5	1.50
P3	1.5	5	5	1.80
P4	2	5	5	2.20
P5	2.5	5	5	1.70

**Table S3** Condition of preparation and IEC of Pcz-SnAT IEM

Sample Code	composites (gm/L)	Binder		Stirring time (hours)	IEC of membrane (Meqg <sup>-1</sup> )
		Poly vinyl chloride (PVC)(gm/L)	THF/mL		
M1	0.25	0.2	25	48	0.48
M2	0.50	0.2	25	48	0.37
M3	0.75	0.2	25	48	0.95
M4	1.0	0.2	25	48	0.62

**Table S4** Percentage composition of Pcz-SnAT composite IEM

S. No.	Elements	Percentage %	
		Pcz-SnAT IEM	Pb <sup>2+</sup> adsorbed Pcz-SnAT IEM
1	C	39.21	46.34
2	N	8.67	10.57
3	O	27.24	21.24
4	Fe	1.23	1.04
5	Sn	14.21	10.03
6	As	6.12	5.10

7	W	3.24	3.54
8	Pb	-	2.13

**Table S5** The selectivity coefficient of different interfering metal ions for Pb<sup>2+</sup>selective Pcz-SnAT composite CEM

Interfering ions ( mol/L <sup>n+</sup> )	Selectivity coefficients (K <sub>M<sub>SM</sub></sub> )
Pb <sup>2+</sup>	1
Ni <sup>2+</sup>	1.17×10 <sup>-2</sup>
Cu <sup>2+</sup>	1.3×10 <sup>-2</sup>
Hg <sup>2+</sup>	1.41×10 <sup>-2</sup>
Cd <sup>2+</sup>	1.8×10 <sup>-2</sup>
Ba <sup>2+</sup>	1.9×10 <sup>-2</sup>
Mg <sup>2+</sup>	1.96×10 <sup>-2</sup>

**Table S6** Slopes of different  $\tau$  vs t graph on Pcz-SnAT composite IEM at 40,60 and 80°C temperatures

Metal ion	10 <sup>-3</sup> S (s <sup>-1</sup> )		
	40°C	60°C	80°C
Pb(II)	1.36	1.65	2.03

**Table S7** Values of  $D_o$ ,  $E_a$  and  $\Delta S^\circ$  for the exchange of  $H^+$  ion with lead ions on Pcz-SnAT

Metal ion( $Pb^{2+}$ ) exchange with $H^+$	$10^{-9}$ Ionic mobility ( $m^2V^{-1}s^{-1}$ )	$10^3$ ionic radii (nm)	$10^{10} D_o$ ( $m^2$ $s^{-1}$ )	$10^{-3} E_a$ ( $k Jmol^{-1}$ )	$\Delta S^\circ$ ( $J K^{-1} mol^{-1}$ )	$\Delta H^\circ$ ( $kJ mol^{-1} K^{-1}$ )	$\Delta G^\circ$ ( $kJ mol^{-1} K^{-1}$ )
Pb(II)	38.4	12.74	8.04	13.6	-141.8	2.62	39.37
composite ion exchanger							