Supplementary data:

The distribution co-efficient (K_d) at different pH has been computed (eq. 2) and the effect of pH on log K_d of Ti(IV) between the adsorbent and solution is depicted in (Fig 7).

$$K_d\left(mL\ g^{-1}\right) = C_s\left(\mu g\ g^{-1}\right) / C_{sol}\left(\mu g\ mL^{-1}\right) \qquad \text{(eq. s1)}$$

Here, C_s and C_{sol} are respective concentrations of Ti(IV) in the solid phase and in solution phase.

separation procedure (f. 1):

When, Ti(IV)-Fe(III) and Ti(IV)-Zr(IV) binary mixtures were passed through the column at pH 2.5, only Ti(IV) from the mixtures was percolated through the column with the mobile phase. The extracted Fe(III) and Zr(IV) were eluted with 0.1 M HCl and 4 M HNO_3 respectively. Binary mixtures containing Ti(IV) with Co(II), Ni(II), Zn(II) and Cd(II) when equilibrated with the SSG-V10 at pH 5.75 except Ti(IV) all the diverse ions were passed through column with the mobile phase. Ti(IV) in each case was stripped with 1 M HCl + H_2O_2. Binary mixtures containing Ti(IV)-Al(III) and Ti(IV)-Pb(II), when passed through the column at pH 5.75, from their respective mixtures both Al(III) and Pb(II) were extracted along with Ti(IV). Al(III) and Pb(II) respectively were eluted with 1M CH_3COOH, and 0.005 M CH_3COOH. Ti(IV) in each case was stripped with 1 M HCl + H_2O_2. In order to justify its possible analytical application, the proposed method was applied to separate Ti(IV) from various multi-component synthetic mixtures. The multicomponent synthetic mixtures containing Fe(III) / Zr(IV), Cr(III) / Co(II) / Ni(II) / Zn(II) / Cd(II) and Ti(IV) when passed through the column at pH 2.5, only Fe(III) / Zr(IV) was extracted. The extracted Fe(III) and Zr(IV) were eluted with 0.1 M HCl and 4 M HNO_3 respectively. The effluent containing Cr(III) / Co(II) / Ni(II) / Zn(II) / Cd(II) and Ti(IV) was then equilibrated with the SSG-V10 at the column at pH 5.75. Under this recommended

condition, from their respective solution only Ti(IV) was extracted and subsequently it was eluted with 1 M HCl + H_2O_2 (table: 6). Synthetic mixture containing Fe(III) / Zr(IV), U(VI) / V(IV) / Th(IV) / Ce(IV) and Ti(IV) when passed through the column at pH 2.5, except Fe(III) / Zr(IV), both the diverse ions (U(VI) / V(IV) / Th(IV) / Ce(IV) and Ti(IV)) were passed through with the mobile phase. The effluent containing U(VI) / V(IV) / Th(IV) / Ce(IV) and Ti(IV) was subsequently passed through the ion-exchange bed at pH 5.75, when both U(VI) / V(IV) / Th(IV) / Ce(IV) and Ti(IV) were extracted at the column. The separations were achieved by using suitable eluting agent.

Supplementary Figure:

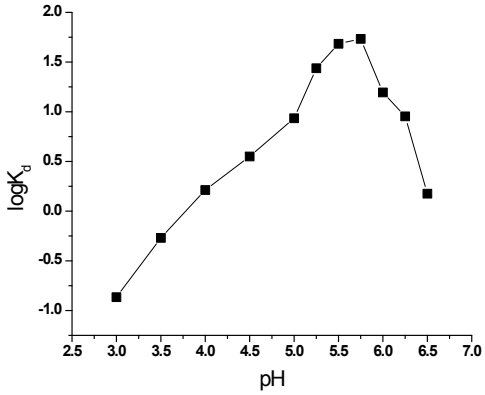

Fig. S1: Plot of pH vs. log K_d at fixed concentration of Ti(IV) & extractant

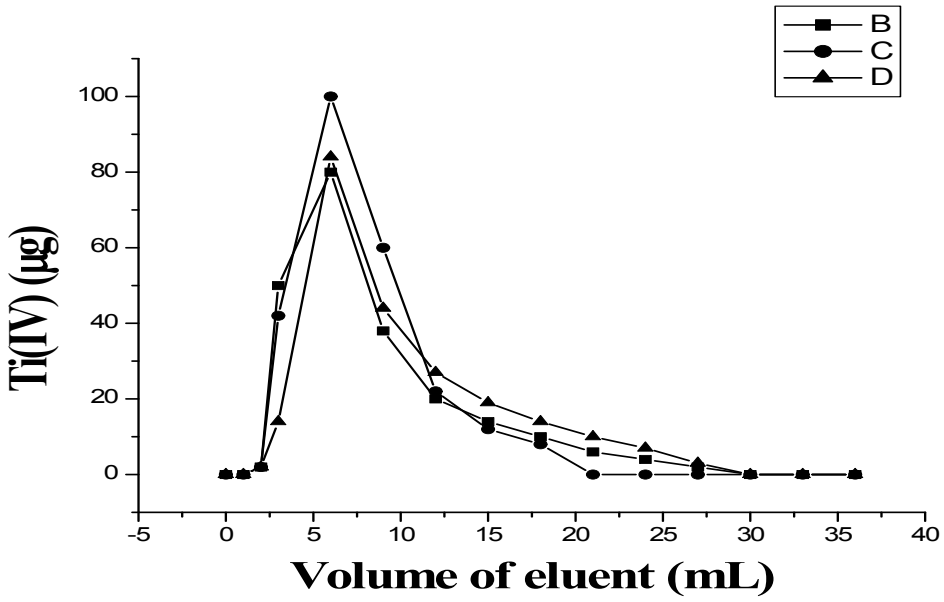

Fig. S2: Elution profile (■ = HNO_3; ● = HCl; ▲=H_2SO_4)

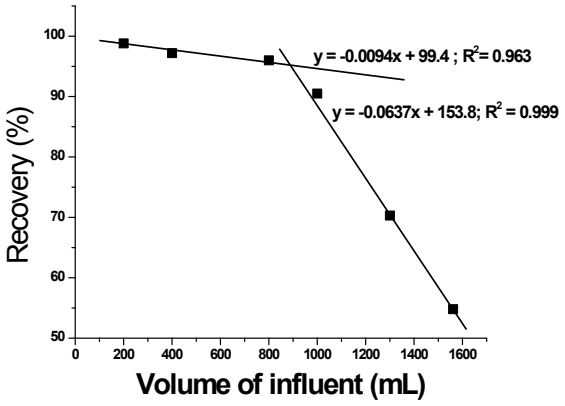

Fig. S3: Effect of influent volume on recovery

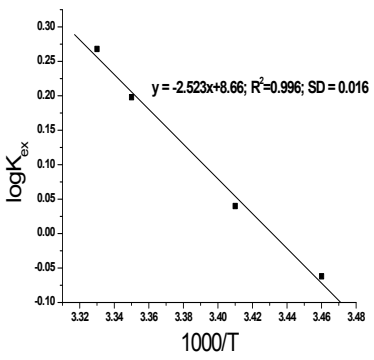

Fig. S4: plot of log K_{ex} vs. 1000/T

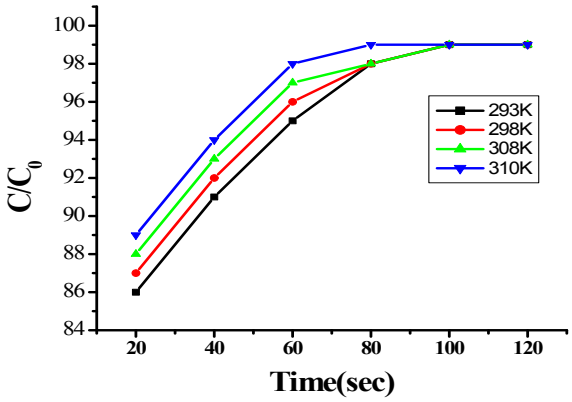

Fig. S5: Effect of reaction temperature on the removal efficiency of Ti(IV)

Supplementary table

Table S1: Elution study of Titanuim (IV)
[Ti(IV) taken: 2.395 mgmL^{-1}; Column-0.8×8cm; flow rate: 1mL min^{-1},pH: 5.75; temp: 25^{0}C]

Eluent	Conc.(M)	V_{max}(mL)	V_{total}(mL)	#Recovery(%)
HNO_3	0.5	50	100	85
	0.7	30	70	97.2
	0.8	25	20	98.3
	1.0	2.5	5	98.8
$HCl + H_2O_2$	0.6	50	100	82
	0.8	40	80	99
	1.0	7.5	15	99.3
H_2SO_4	1.0	40	80	85
	1.3	30	70	89
	1.5	25	60	92
CH_3COOH	1.0	--	--	Nil
	1.5	30	70	40
	2.0	30	50	59.3

#Average of five determinations

Table S2: R_f values and selectivity factors ($\alpha = (R_f)_i / (R_f)_{Ti(IV)}$) of different metal ions on Whatman No 1 impregnated with Versatic-10; [Time = 2.5 hours; pH = 5.75; [a]pH = 2.5; developing solvent = acetate buffer : acetone (25:1) v/v]

Metal ions	R_f values	Affinity order	Selectivity factor (α)	Metal ions	R_f values	Affinity order	Selectivity factor (α)
Ca(II)	0.92	Sn(II)	15.83	U(VI)	0.14	V(IV)	6.67
Mg(II)	0.90	Ca(II)	15.33	V(IV)	0.40	Al(III)	3.33
Co(II)	0.89	Mg(II)	15.00	Al(III)	0.20	Ce(IV)	2.83
Zn(II)	0.88	Co(II)	14.83	Ce(IV)	0.17	U(VI)	2.33
Cd(II)	0.84	Ni(II)	14.66	Th(IV)	0.02	Ga(III)	2.17
Pb(II)	0.51	Zn(II)	14.66	Ga(III)	0.13	Th(IV)	[b]3.00
Sn(II)	0.95	Cr(III)	14.33	Ti(IV)	0.06	Ti(IV)	1.00
Cr(III)	0.86	Cd(II)	14.00	Fe(III)	[a]0.38	Ti(IV)	[a]1.00
Ni(II)	0.88	Pb(II)	08.50	Ti(IV)	[a] 0.90	[a]Fe(III)	[b]2.37
Ce(IV)	0.22	Ce(IV)	03.67	Zr(IV)	[a] 0.04	[a] Zr(IV)	[b]15.5

b = $(\alpha)^{-1}$

Table S3: Determination of Ti (IV) and Cr (III) in water samples [Ti(IV) = 230 µg mL^{-1} ; Cr(III) = 204 µg mL^{-1}; sample volume = 800 mL]

Sample	Metal ion	Water Added (µg)	¶Found (µg)	Recovery (%)	PF
pond water	Ti(IV)	- 184000	ND 178160	- 96.8	154.9
	Cr (III)	- 163200	N D 154332	- 94.5	
Well water	Ti(IV)	- 184000	ND 179696	- 97.7	156.2
	Cr(III)	- 163200	N D 156002	- 95.6	

¶Average of five determinations

Table S4: Comparison of the observed conc. (Spectrophotometry) with the preconcentration technique after separation. [Sample volume 800 mL, flow-rate = 5 mL min^{-1}.

Sample	Concentration (μg mL^{-1})			Relative Error (%)
	Added	Spectrophotometry	predicted	
Pond water	230.0	233.91(1.70)	234.4	1.91
Well water	230.0	234.20 (1.82)	236.4	2.78

Values in the parenthesis represent the relative errors (%).