Electronic Supplementary Information

Synthesis of new hybrid sorbent 2-mercaptobenzaldehyde SBA-15 and its application in solid phase extraction of Cd(II) from water and food samples

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S1 Determination of Cd(II) in water and vegetable samples

S 1.1 Collection and Preparation of water samples

The natural water samples were collected from two different places in Tirupati (A.P, India) in polyethylene bottles. The water samples were filtered through a 0.45μm cellulose membrane filter, spiked with known concentrations of Cd(II) and acidified to a pH of about 2.0 with concentrated HNO_3 and kept aside for overnight. 500ml of stored water sample was taken and pH was adjusted to 6.0 with 1:1 HCl or 1:1 ammonia followed by 2ml of acetate buffer and followed the procedure described in section 2.6 for determination of Cd concentration in each sample.

S 1.2 Collection of food samples

The vegetable samples namely, onion (Alium cepa), Lady's Finger (Abelmoschus esculentus), cucumber (Cucumis sativus) and tomato (Solanum lycopersicum) were collected in polyethylene bags from the nearby agricultural fields of Tirupati.

S 1.3 Sample preparation

The following procedure was used for food sample preparation. First, the collected vegetable samples were air dried for 5 days, then cleaned with double-distilled water followed by drying at 100 ^oC in a hot air oven for 3 h and then powdered. In second step, one gram of each sample was taken in PTFE digestion vessel, spiked with known concentrations

of Cd(II), homogenised and allowed for 24 h , and 5mL of concentrated nitric acid was added to each flask. After allowing for 10 h, the samples were digested in a microwave system for 10 min at 105 ^{o}C. A clear solution was obtained. The digested samples were further made up to 25 mL using double-distilled water and determined as described in section 2.5.

Table S1.a) Effect of the flow rates in the Cd(II) recovery.

Flow rate (mL/min)	% Recovery of Cd (II)[a]
0.5	94.3±2.5
1.5	95.2±4.8
2.0	94.8±3.1
2.5	95.7±3.5
3.0	95.1±4.2
3.5	94.8±3.4
4.0	94.2±3.8

b) Effectof eluent flow rate can recovery of Cd(II)

Flow rate (mL/min)	% Recovery of Cd (II)[a]
0.2	94.1±3.4
0.4	95.4±2.6
0.6	94.6±2.8
0.8	92.1±3.8
1.0	91.5±3.1

[a] Average of four determinations±standard deviation.

Table S2. Effect of interfering ions on determination of Cd(II)

Foreign ions	Tolerance limit μgL^{-1}	Recovery (%)
Li^{+}	1600	94.2±1.0
Na^{+}	2100	93.8±1.0
K^{+}	1600	93.6±2.0
Mg^{+2}	1100	93.7±0.9
Ca^{+2}	1100	93.4±1.0
Al^{+3}	1800	94.0±2.0
Fe^{+3}	600	92.9±1.0
Zn^{+2}	450	92.5±0.8
Cr^{+3}	600	92.6±0.7
Cu^{+2}	350	93.0±0.6
Ni^{+2}	350	93.0±1.0
Mn^{2+}	150	92.6±0.7
CH_3COO^{-}	100	93.1±2.0
$HCOO^{-}$	100	93.6±1.0
Cl^{-}	600	94.0±1.0
SO_4^{-2}	500	93.5±0.5
NO_3^{-}	400	94.2±0.7
CO_3^{-2}	500	94.0±0.8
PO_4^{-2}	200	93.5±1.0

Table S3. Percentage of recovery of Cd(II) ions from the functionalized SBA-15 using different eluents.

Eluent Solution	Volume (mL)	% Recovery of Cd(II) (RSD)
CH_3COOH(M)	5	62.2 (0.8)
CH_3COOH(M)	15	66.5 (0.5)
CH_3COOH(M)	25	73.9 (1.2)
HCl(M)	5	62.8 (1.0)
HCl(M)	15	69.5 (0.6)
HCl(M)	25	75.9 (0.9)
HNO_3(M)	5	95.2 (1.0)
HNO_3(M)	15	95.6 (0.8)
HNO_3(M)	25	95.8 (1.3)

Table S4. Comparison of determination of Cd(II) by AAS method and ICPAES method

		Vegetables samples(A. cepa (onion))	
S. No.	Spiked	AAS method(µg/kg)	ICPAES method (µg/kg)
1	0	0.021	…..
2	5	5.01±0.6	5.025±0.9
3	10	9.73±0.2	9.25±0.7
4	15	14.58±0.1	14.78±0.5

Table S5. Determination of Cd(II) in water and vegetable samples.

Sample	Spiked (µg/L)	Found (µg/L)	Recovery (%)
Water Sample.1	0.0	0.95±0.4	-
	5.0	5.56±0.2	93.44
	10.0	10.20±0.3	93.15
	15.0	15.09±0.1	94.60
Water Sample.2	0.0	0.92±0.2	-
	5.0	5.55±0.4	93.75
	10.0	10.10±0.3	92.49
	15.0	15.04±0.6	93.47

Vegetables	Spiked (µg/Kg)	Found (µg/Kg)	Recovery (%)
A. cepa (onion)	0.0	0.87±0.3	-
	5.0	5.45±0.2	92.84
	10.0	10.2±0.1	93.83
	15.0	15.01±0.4	94.58
A. esculentus (Lady's Finger)	0.0	0.89±0.2	-
	5.0	5.42±0.1	92.02
	10.0	10.15±0.3	93.20
	15.0	15.01±0.2	94.46
C. sativus (cucumber)	0.0	0.96±0.6	-
	5.0	5.57±0.3	93.29
	10.0	10.16±0.1	92.70
	15.0	15.02±0.1	94.11
L. esculentum (tomato)	0.0	0.94±0.2	-
	5.0	5.49±0.3	92.73
	10.0	10.18±0.1	93.31
	15.0	15.02±0.3	94.22