

APPENDIX

1. Data of concentration of Cr (VI) in the filtrate after passing deionized water to the column that remained sand

Table 1 The concentration of Cr (VI) in the filtrate

Size of sand (mm)	Concentrations ($\mu\text{g L}^{-1}$) \pm SD*
0.330-0.425	0.53 \pm 0.18
0.425-0.600	0.34 \pm 0.12
0.600-0.850	0.10 \pm 0.06

* 3 replicates, RSD < 10 %

2. Data of residue concentration of iron and Cr (VI) in the filtrate after removal of Cr (VI) in wastewater by using iron oxide – coated sand (IOCS) and determination of iron by Analyst 300 Flame atomic absorption spectrophotometer. Chromium was determined by graphite furnace atomic absorption spectrophotometer.

Table 2 The residue concentration of iron and Cr (VI) in the filtrate at the difference sizes of sand

Size of sand (mm)	Concentrations of iron (mg L^{-1}) \pm SD*	Concentrations of Cr (VI) (mg L^{-1}) \pm SD*
0.330-0.425	13.45 \pm 2.07	0.23 \pm 3.81
0.425-0.600	13.27 \pm 2.27	0.67 \pm 2.33
0.600-0.850	16.28 \pm 1.05	1.08 \pm 7.05

* 3 replicates, RSD < 10 %

Table 3 The residue concentration of Cr (VI) in the filtrate at uncoated and coated FeCl₃ on sand

Conditions	Concentrations of Cr (VI) (mg L ⁻¹) ± SD*
coated FeCl ₃ on sand	0.00 ± 0.70
uncoated FeCl ₃ on sand	4.37 ± 1.90

* 3 replicates, RSD < 10 %

Table 4 The residue concentration of iron and Cr (VI) in the filtrate at the different pHs

pH	Concentrations of iron (mg L ⁻¹) ± SD*	Concentrations of Cr (VI) (mg L ⁻¹) ± SD*
3	53.80 ± 2.36	0.72 ± 2.78
5	68.39 ± 2.95	0.25 ± 2.11
7	29.02 ± 0.98	0.00 ± 0.76
8	66.56 ± 2.56	0.44 ± 3.03
9	77.01 ± 1.89	0.39 ± 1.88

*3 replications, RSD < 10%

Table 5 The residue concentration of iron and Cr (VI) in the filtrate at different concentrations of FeCl₃ coated on sand

Concentration of FeCl ₃ (M)	Concentrations of iron (mg L ⁻¹) ± SD*	Concentrations of Cr (VI) (mg L ⁻¹) ± SD*
0.25	22.72 ± 2.58	1.00 ± 2.01
0.50	32.05 ± 4.32	0.80 ± 4.47
0.70	29.10 ± 2.15	0.70 ± 3.15
0.90	41.00 ± 2.16	0.69 ± 4.62
1.00	29.79 ± 4.15	0.00 ± 0.70

*3 replications, RSD < 10%

Table 6 The residue concentration of iron and Cr (VI) in the filtrate at various flow rates

Flow rate (mL min ⁻¹)	Concentrations of iron (mg L ⁻¹) ± SD*	Concentrations of Cr (VI) (mg L ⁻¹) ± SD*
1.0	10.90 ± 1.75	0.87 ± 0.70
2.5	11.10 ± 1.20	1.31 ± 1.22
5.0	14.20 ± 2.86	1.40 ± 3.85
7.5	10.86 ± 4.05	1.28 ± 3.10

*3 replications, RSD < 10%

Table 7 The residue concentration of iron and Cr (VI) in the filtrate at various times for coating FeCl₃ on sand

Time for coating FeCl ₃ on sand (hour)	Concentrations of iron (mg L ⁻¹) ± SD*	Concentrations of Cr (VI) (mg L ⁻¹) ± SD*
1.0	48.90 ± 2.82	0.87 ± 1.82
3.0	31.25 ± 2.56	0.77 ± 1.04
5.0	47.68 ± 3.88	0.58 ± 1.68
7.0	31.81 ± 0.52	0.66 ± 1.34
9.0	17.59 ± 2.14	0.59 ± 1.01
12.0	43.52 ± 0.36	0.86 ± 0.35

*3 replications, RSD < 10%

Table 8 The residue concentration of iron and Cr (VI) in the filtrate at various weights of sand

Weight of sand (g)	Concentrations of iron (mg L ⁻¹) ± SD*	Concentrations of Cr (VI) (mg L ⁻¹) ± SD*	Residence time (min)
10	29.74 ± 1.52	4.12 ± 2.58	7
20	36.80 ± 0.99	0.91 ± 0.96	13
30	29.48 ± 0.14	0.03 ± 0.19	19

*3 replications, RSD < 10%

Table 9 The residue concentration of iron and Cr (VI) in the filtrate at various types of anion

Type of anion	Concentrations of iron (mg L ⁻¹) ± SD*	Concentrations of Cr (VI) (mg L ⁻¹) ± SD*
NO ₃ ⁻	40.25 ± 2.50	0.01 ± 0.09
SO ₄ ²⁻	43.48 ± 1.02	0.09 ± 0.34
PO ₄ ³⁻	27.85 ± 4.26	0.10 ± 0.18

*3 replications, RSD < 10%

Table 10 The residue concentration of iron and Cr (VI) in the filtrate in four wastewater spiked with 10 mgL⁻¹ Cr (VI) samples

Locations	Concentrations of iron (mg L ⁻¹) ± SD*	Concentrations of Cr (VI) (mg L ⁻¹) ± SD*
Facultative pond	22.09 ± 1.26	0.25 ± 0.03
Final polishing pond 1	30.15 ± 3.20	0.16 ± 0.08
Final polishing pond 2	25.38 ± 1.00	0.19 ± 0.05
Constructed wetland	33.50 ± 2.32	0.09 ± 0.04

* 3 replications, RSD < 10%

3. Data of initial concentration of Cr (VI) in feedmill wastewater samples

Table 11 The initial concentration of Cr (VI) in four feedmill wastewater samples

Locations	Concentrations (µg L ⁻¹)
Facultative pond	0.05
Final polishing pond 1	0.76
Final polishing pond 2	0.00
Constructed wetland	0.56