

Article

Evaluating Potential Ecological Risks of Heavy Metals of Textile Effluents and Soil Samples in Vicinity of Textile Industries

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Supplementary material

Table S1. Descriptions of the soil contamination indices used in the study.

Indices.	Formulas	Explanations	Limit values	Classification	References
Geoaccumulation index (Igeo)	$I_{geo} = \log_2 \left(\frac{C_n}{1.5 B_n} \right)$	C _n : content of heavy metal in soil; B _n : background value; 1.5: constant	<0	Class 0: practically uncontaminated	[1,2]
			0-1	Class 1: uncontaminated to moderately contaminated	
			1-2	Class 2: moderately contaminated	
			2-3	Class 3: moderately to heavily contaminated	
			3-4	Class 4: heavily contaminated	
			4-5	Class 5: heavily to extremely contaminated	
			>5	Class 6: extremely contaminated	
Contamination factor (CF)	$CF = \frac{C_i}{C_n}$	C _i : content of heavy metal in soil; C _n : background value of heavy metal element i	<1	Class 1: low contamination	[2,3]
			1-3	Class 2: moderate contamination	
			3-6	Class 3: considerable contamination	
			>6	Class 4: very high contamination	
Contamination degree (Cdeg)	$C_{deg} = \sum_{i=1}^n CF_i$	CF: contamination factor of single heavy metal; n: number of heavy metals	<8	low degree of contamination	[4,5]
			8-16	moderate degree of contamination	
			16-32	considerable degree of contamination	
			>32	very high degree of contamination	
Modified contamination degree (mCdeg)	$mC_{deg} = \frac{\sum_{i=1}^n CF_i}{n}$	CF: contamination factor of single heavy metal; n: number of heavy metals	<1.5	nil to very low degree of contamination	[6]
			1.5-2	low degree of contamination	
			2-4	moderate degree of contamination	
			4-8	high degree of contamination	

			8<16	very high degree of contamination	
			16-32	extremely high degree of contamination	
			>32	ultra high degree of contamination	
			<0.7	Unpolluted	
Numerow's pollution index (PI)	$PI = \sqrt{\frac{(CF_{aver})^2 + (CF_{max})^2}{2}}$	CF _{aver} : average value of the contamination factor; CF _{max} : maximum value of the contamination factor	0.7-1	Slightly unpolluted	[5,7]
			1-2	Moderately polluted	
			2-3	Severely polluted	
			>3	Heavily polluted	
			<1	No pollution	
Pollution load index (PLI)	$PLI = \sqrt[n]{CF_1 \times CF_2 \times \dots \times CF_n}$	CF: contamination factor; n: number of metals	1-2	Moderate pollution	[8]
			2-3	Heavy pollution	
			>3	Extremely heavy pollution	
			<40	low potential ecological risk	
Potential ecological risk factor (ER _i)	$ER_i = CF_i \times Tr^i$	Tr ⁱ : toxicity response coefficient of heavy metal; CF _i : contamination factor of heavy metal	40-80	moderate potential ecological risk	[3,9,10]
			80-160	considerable potential ecological risk	
			160-320	high potential ecological risk	
			>320	very high potential ecological risk	
			<150	low ecological risk	
Potential ecological risk index (RI)	$RI = \sum_{i=1}^n ER_i$	ER _i : potential ecological risk factor for heavy metal; n – number of analysed heavy metals	15-300	moderate ecological risk	[3]
			300-600	considerate ecological risk	
			>600	very high ecological risk	

Table S2. Summary of reference doses (RfD) and slope factors (SF) of heavy metals.

Heavy metals (mg/kg)	Reference dose (RfD) [11]			Slope factor (SF) [12]		
	Ingestion	Inhalation	Dermal	Ingestion	Inhalation	Dermal
Cd	0.001	0.001	0.00001	6.1	6.3	-
Cr	0.003	0.0000286	0.003	0.501	42	20
Co	0.02	0.00000571	0.016	-	9.8	-
Cu	0.04	0.04	0.012	-	-	-
Ni	0.02	0.0206	0.00540	1.7	-	42.5
Pb	0.0014	0.00352	0.000524	0.0085	0.042	-
Zn	0.3	0.30	0.060	-	-	-

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