Supplementary Materials

Table S1. Experimental Operation Conditions for All Column Experiments

Parameter	Unit	Filter Media		
		ESC	GAC	ESC-GAC
Flow Rate (Q)	mL/min	1.25	1.25	1.25
Diameter (D)	cm	2.0	2.0	2.0
Length (L)	cm	8.0	8.0	8.0
Porosity (n)		0.45	0.48	0.46
Adsorbent Mass (M_s)	g	29.3	28.7	29.1
Hydraulic Loading (u)	cm/min	0.4	0.4	0.4
EBCT	min	20.0	20.0	20.0

Table S2. Comparison of Breakthrough Adsorption Capacity (q_b) Obtained in This Work with the Results of Other Researchers

Adsorbent	**q_b**	**t_b**	**t_s**	**HLR**	**EBCT**	**C_{in}**	**Reference**
CES	3.26						
CES-GAC	3.34	8 d	NR	0.4	20	6.7	This study
GAC	3.28						
Corn Cob In synthetic solution	2.14	< 1 h	24 h	1.27	7.9	100	(49)
Pinus pinaster bark In synthetic solution	0.38	7.5 min	NR	2.21	6.8	100	(50)
Sugarcane bagasse In synthetic solution	5.06	80 min	195 min	4.7	6.8	20	(51)
Garlic Peel Powder In synthetic solution	13	160 min	340 min	7.1	2.1	50	(52)
Modified Coal Fly Ash (MCFA)							
- in pulp mill wastewater	1.01	130 min	NR	1.27	10.6	78	(53)
- in paper mill wastewater	1.54	198 min					

q_b: Adsorption capacity (mg/g) at breakthrough time; t_b: Breakthrough time; t_s: Saturation time; HLR: Hydraulic Loading Rate (cm/min); EBCT: Empty Bed Contact Time(min);C_{in}: Influent phenols concentration (mg/L)

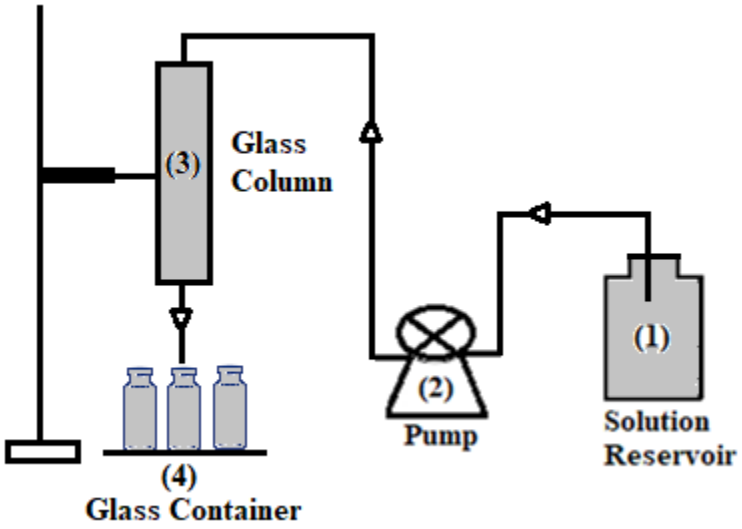

Fig. S1. Schematic drawing of the column experimental setup.

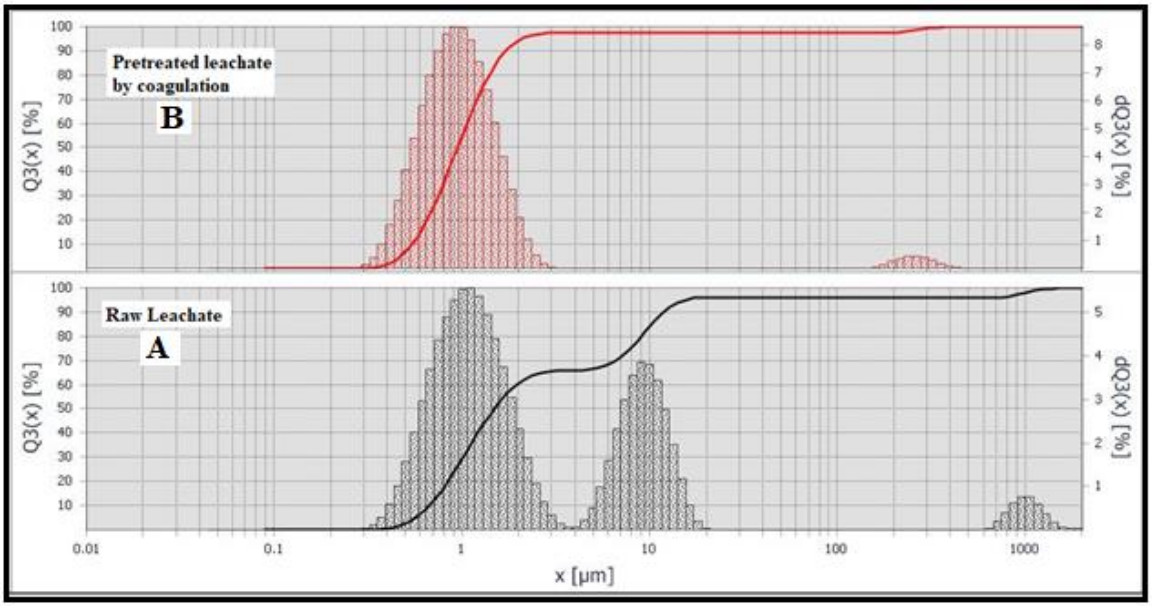

Fig. S2. PSD of raw leachate (a) and leachate pretreated by coagulation-flocculation at alum dosage of 3.5 g/L (b).

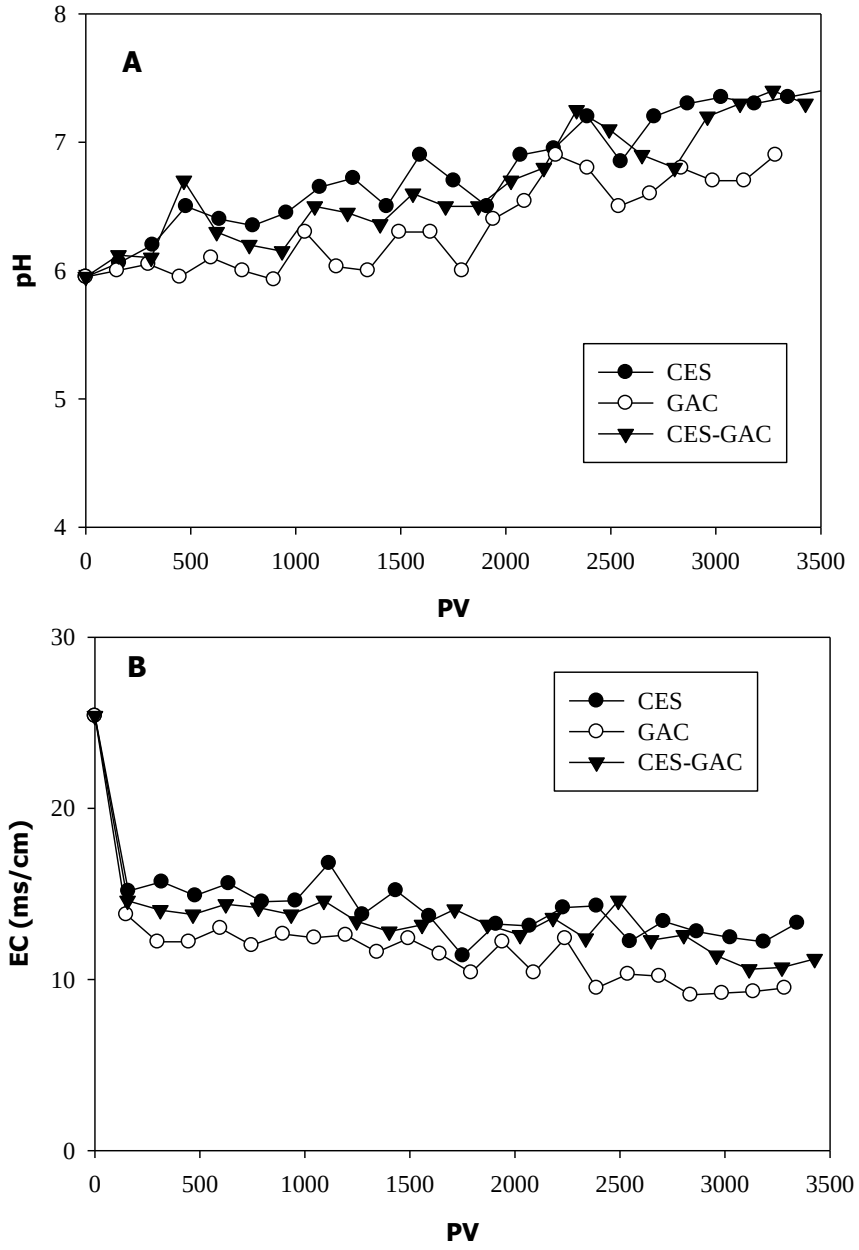

Fig. S3. pH (a) and EC (b) of leachate effluent from all columns. The pH and EC values at PV = 0.0 represents the influent values. (T = 25^{o}C, Q = 1.25 mL/min, HLR = 0.4 cm/min, EBCT = 20 min)

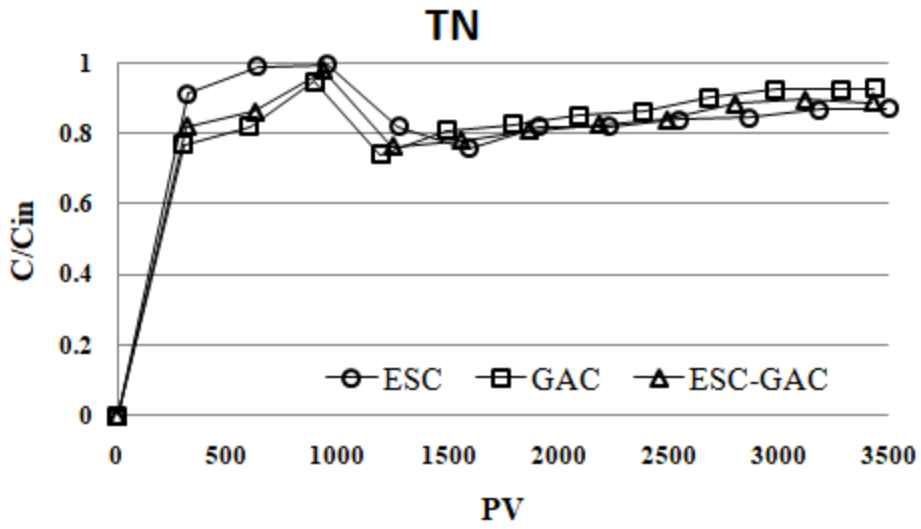

Fig. S4. Breakthrough curves of TN in ESC and GAC columns. (T = 25^{o}C, Q = 1.25 mL/min, HLR = 0.4 cm/min, EBCT = 20 min)