Electronic Supporting Information (ESI)

Milli-sized calcium alginate sorbent supporting the dye waste – calcium fluoride hybrid for adsorption of organic contaminants

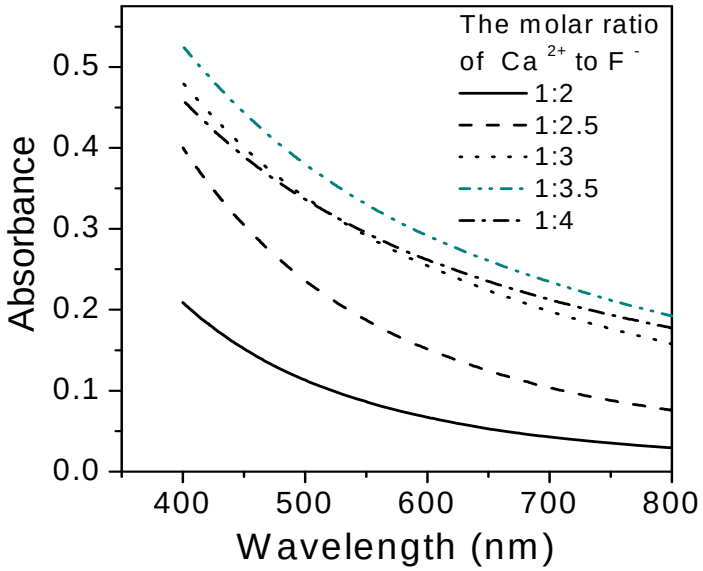

Fig. S1. The optimum dosages of F^- addition in the process of becoming CaF_2 in the presence of 0.04 mol/L Ca^{2+}.

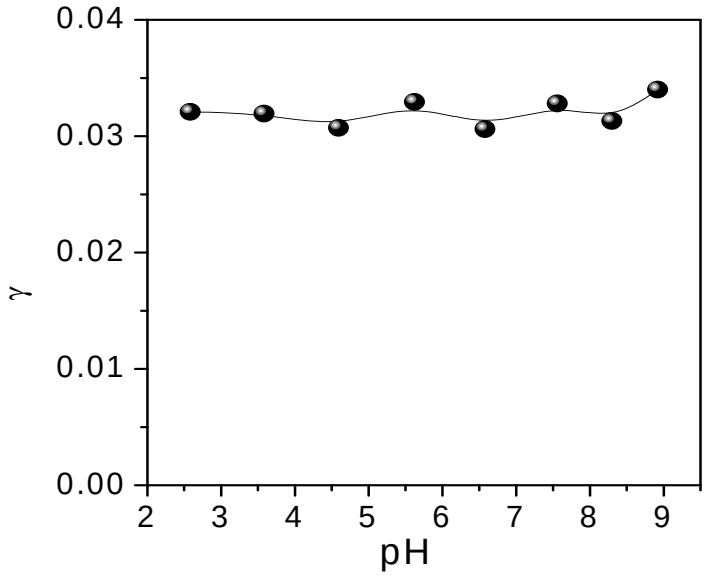

Fig. S2 Effect of pH on formation of the CFA where 0.04 mol/L F^- , 0.016 mol/L Ca^{2+} and 1.6 mmol/L APRB were added.

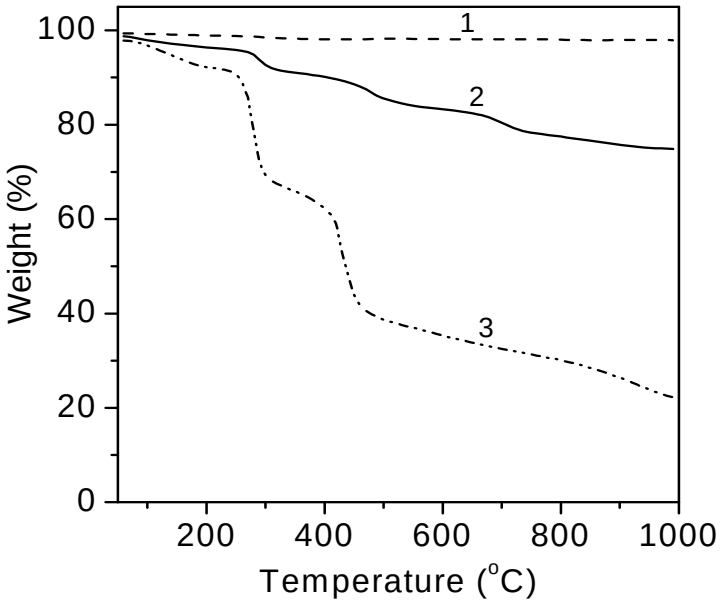

Fig. S3 TGA of CaF_2-only, CFA and APRB-only. 1. CaF_2-only, 2. CFA, 3. APRB-only.

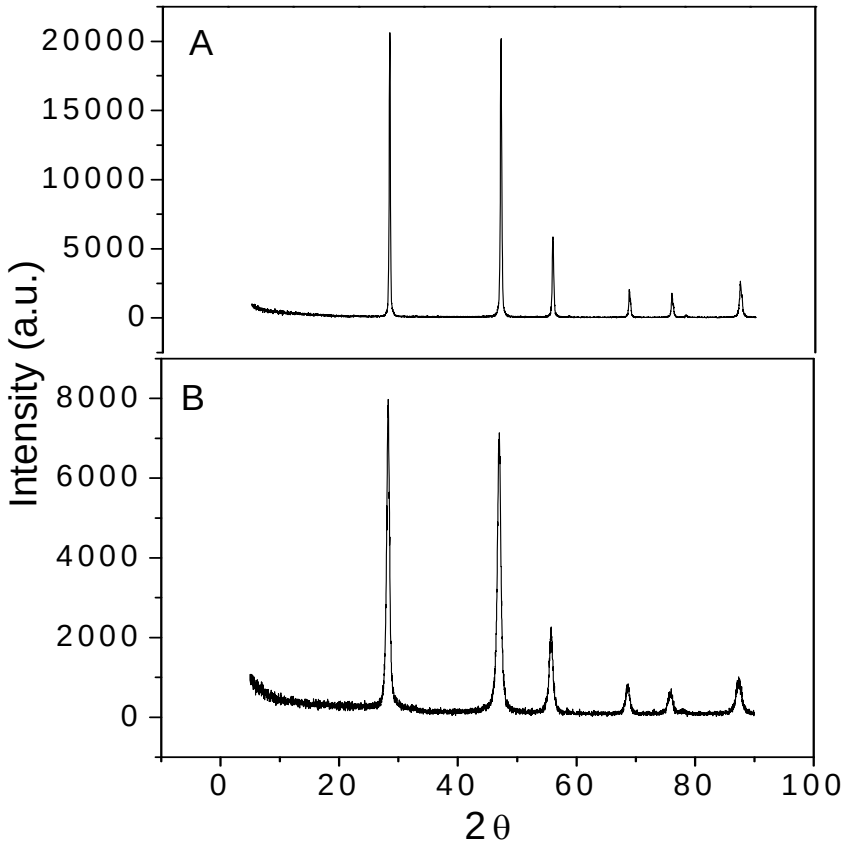

Fig. S4 XRD of CaF_2 (A) and CFA (B).

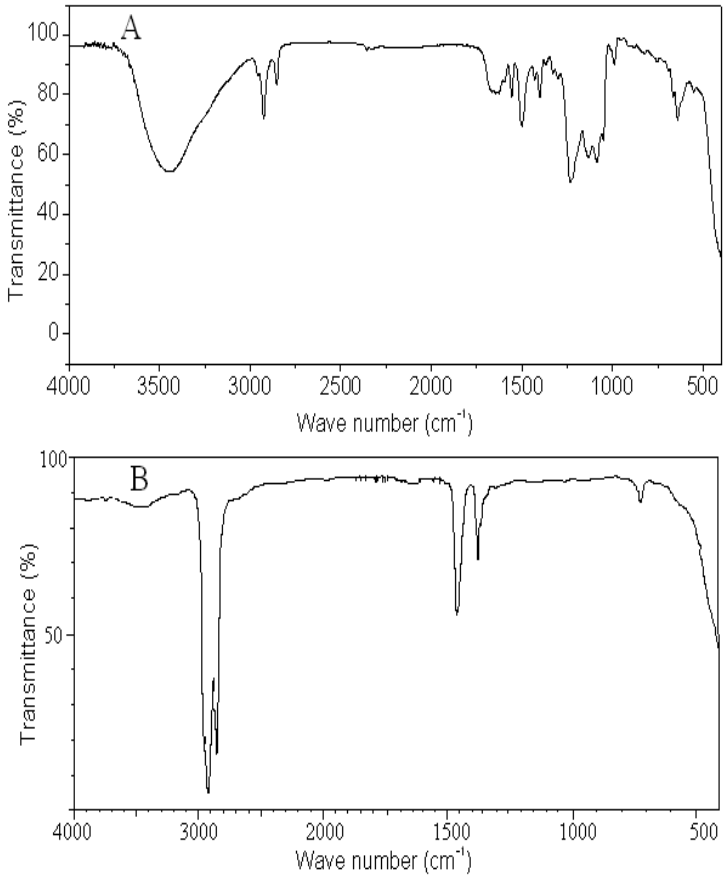

Fig. S5 IR spectra of CFA (A) and CaF_2 (B, copy from: Spectral database for organic compounds SDBS, http://riodb01.ibase.aist.go.jp/sdbs/cgi-bin/direct_frame_top.cgi)

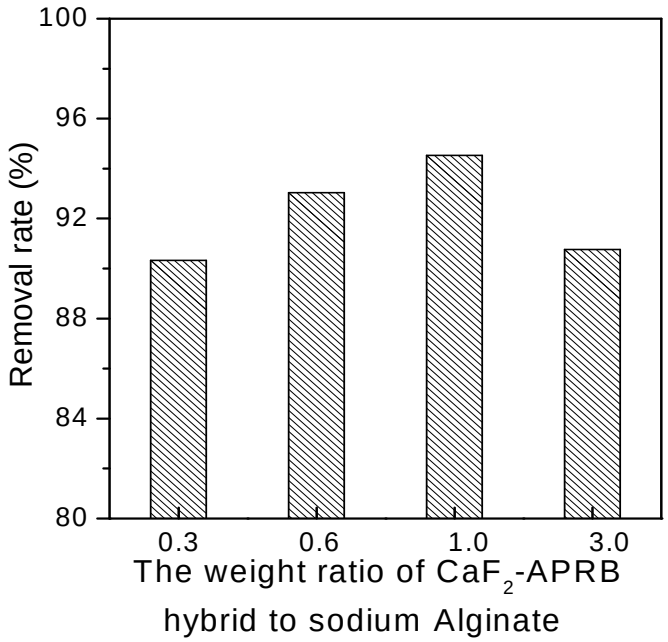

Fig. S6 Effect of the different weight ratio of CFA to sodium alginate on preparing for CASCA and for the removal EV. 50.0 mL of 20 μmol/L EV and 3.0 g of wet CASCA were oscillated for 1 h in shaking table.

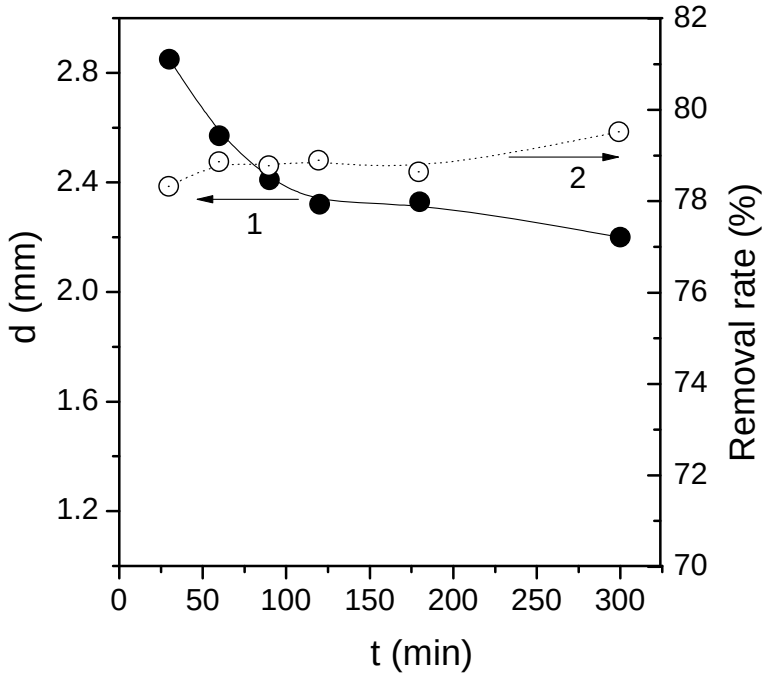

Fig. S7 The optimum curing time of CASCA. 1. diameter size of CASCA, 2. removal rate of EV. 50.0 mL of 45 μmol/L EV and 3.0 g of wet CASCA were oscillated for 1 h in shaking table, CASCA curing 1 h in 2% Ca^{2+}.

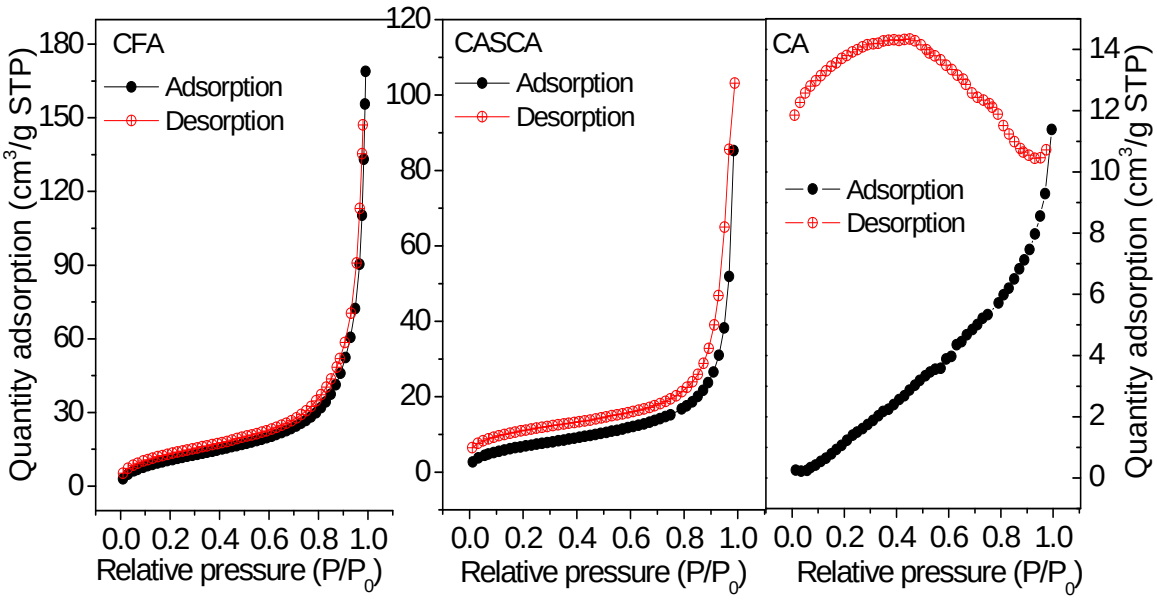

Fig. S8 N_2 adsorption/desorption isotherm for CFA, CASCA and CA.

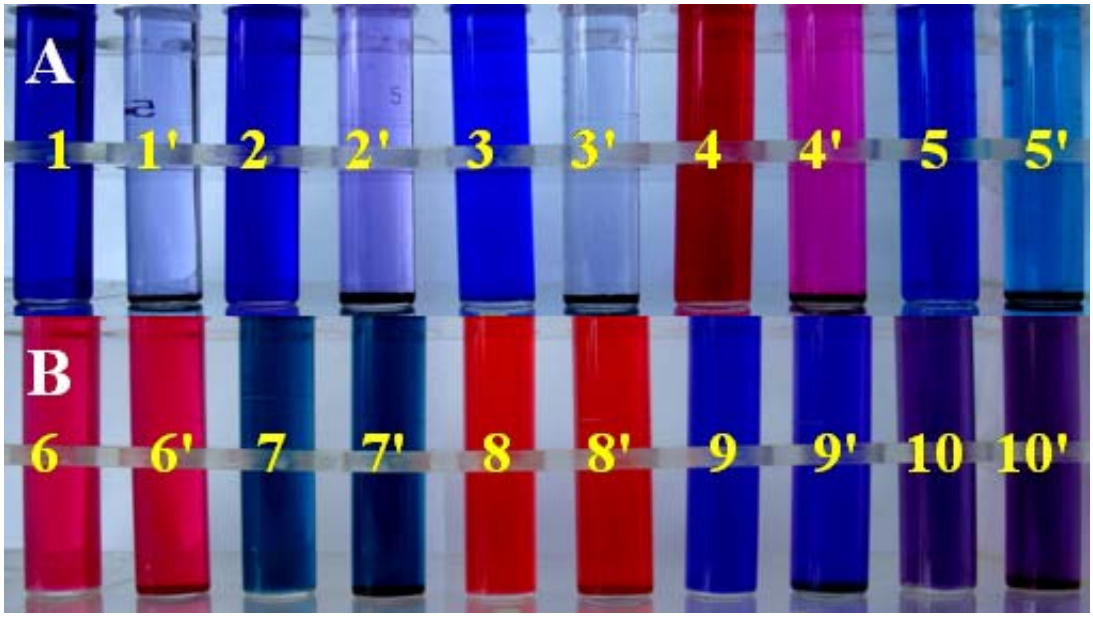

Fig. S9 Images of the dye solutions containing 1. CR3R, 2. EV, 3.VBB, 4. CR3R, 5. MB, 6. reactive brilliant red X-3B, 7. weak acidic green GS, 8. reactive brilliant red K-2BP, 9. acid brilliant blue 6B, 10. mordant blue 9. From 1 to 10 dye-only, and from 1' to 10' dye treated with CFA (0.04%), all dye solutions are in 100 μmol/L.

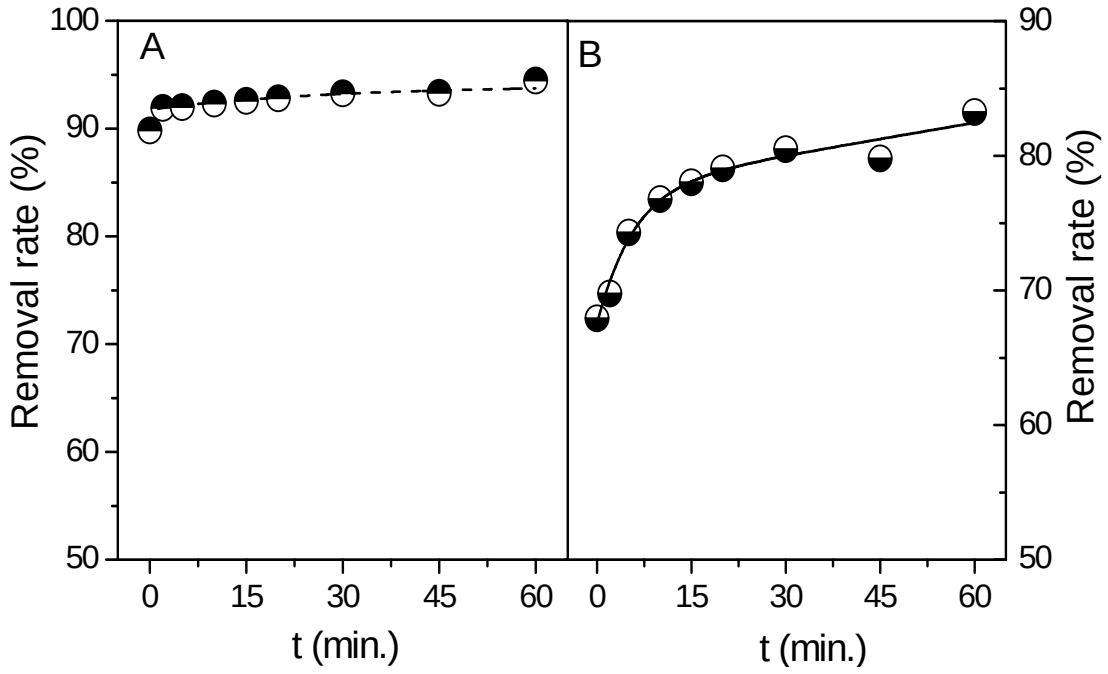

Fig. S10 Effect of time on the removal rate of dyes (A-EV, B-BBBO). 175 μmol/L dye was treated with 0.04% CFA.

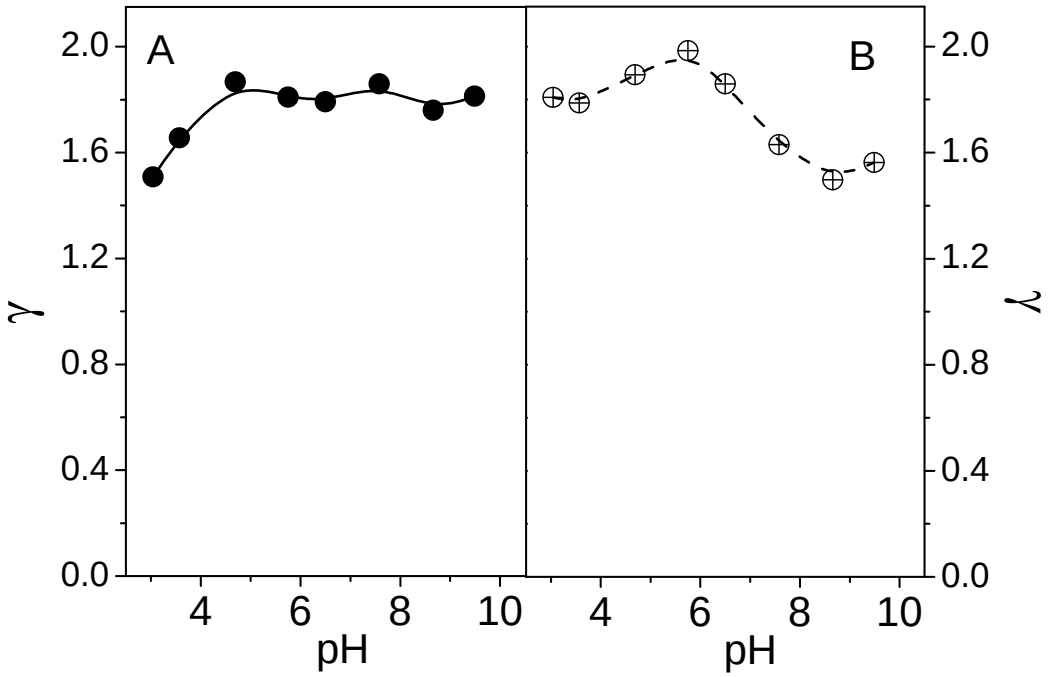

Fig. S11 Effect of pH on the removal rate of dyes (A-EV, B-BBBO). 175 μmol/L dye was treated with 0.04% CFA

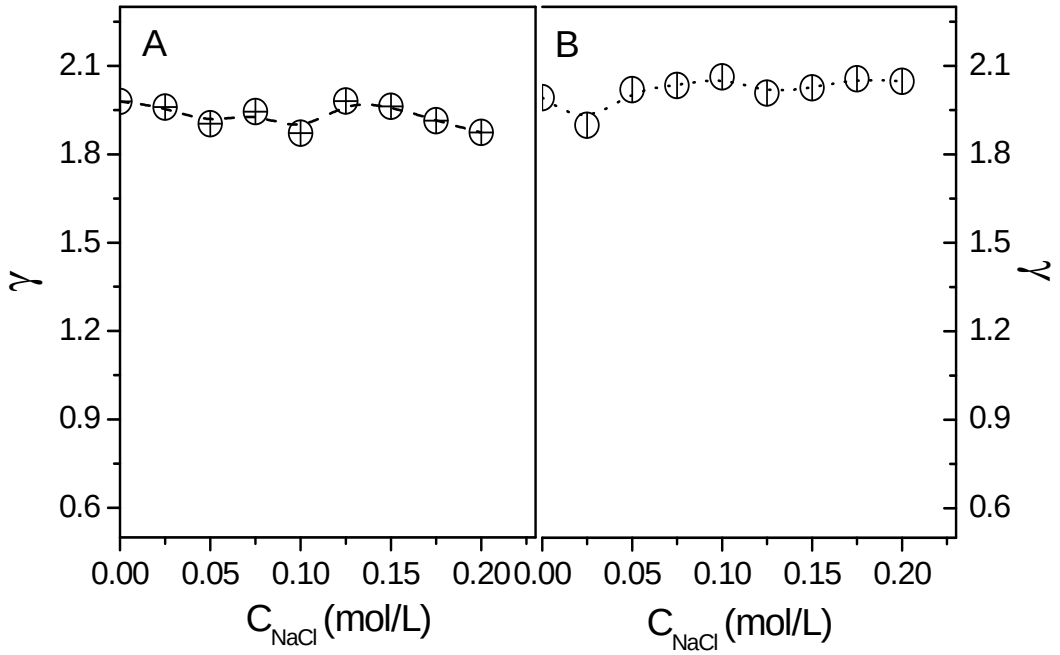

Fig. S12 Effect of NaCl on the removal rate of dyes (A-EV, B-BBBO). 175 μmol/L dye was treated with 0.04% CFA

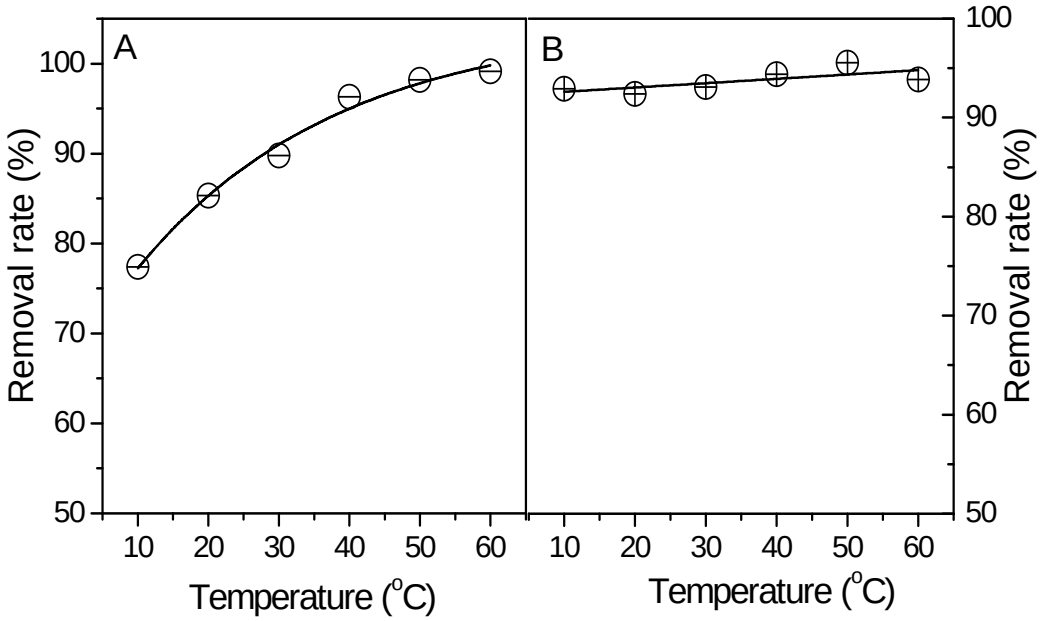

Fig. S13 Effect of temperature on the removal rate of dyes (A-EV, B-BBBO). 175 μmol/L dye was treated with 0.04% CFA.

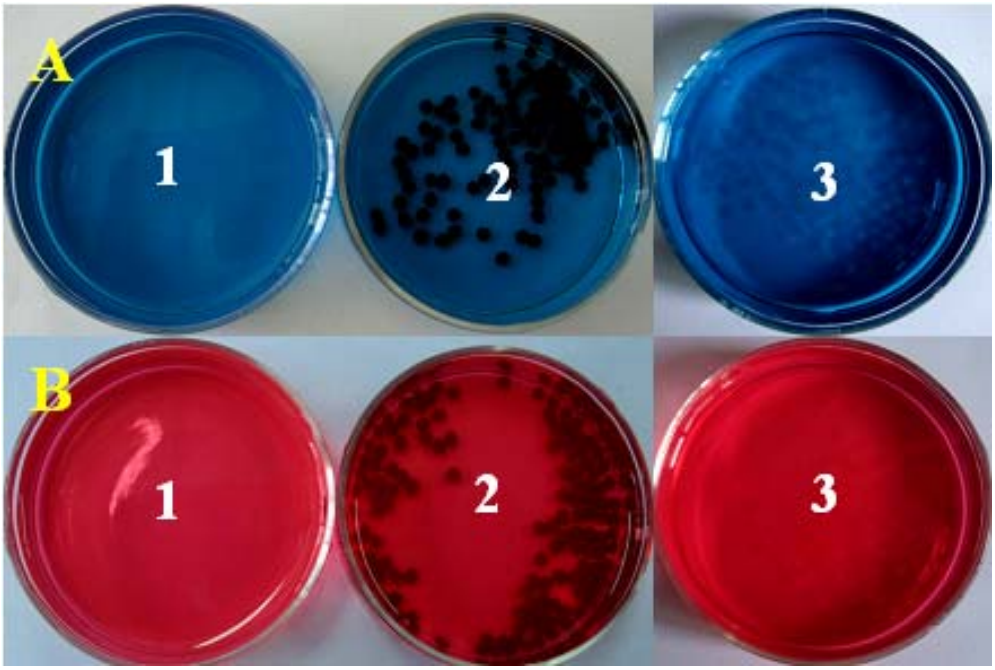

Fig. S14 Photos illustrating color change of dye supernatants: weak acid green GS (A), reactive brilliant red K-2BP (B). All dyes are in 40 μmol/L. 1: dye-only; 2: dye treated by adding 1.0 g of wet CASCA; 3: treated by adding 1.0 g of wet CA. All liquids were oscillated for 3 h in shaking table.

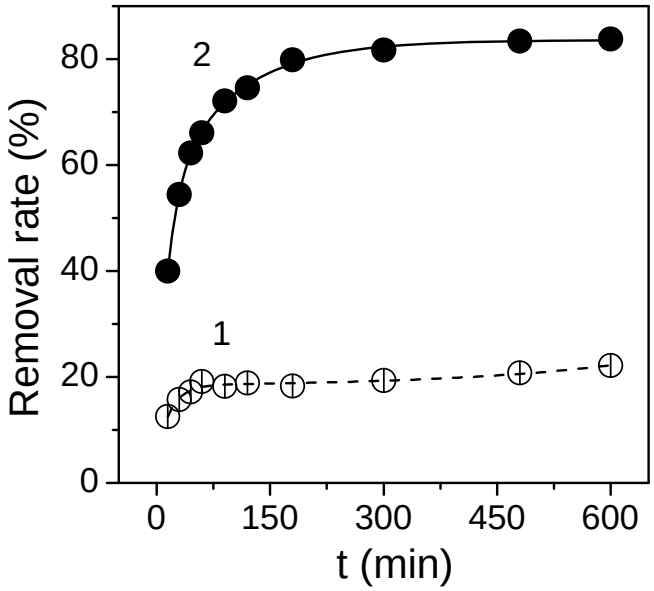

Fig. S15 Effect of time on absorbent CA (curve 1) and CASCA (curve 2) removal rate of CR3R. 50.0 mL of 125 μmol/L CR3R and 1.0 g of wet CA and CASCA were oscillated in shaking table.

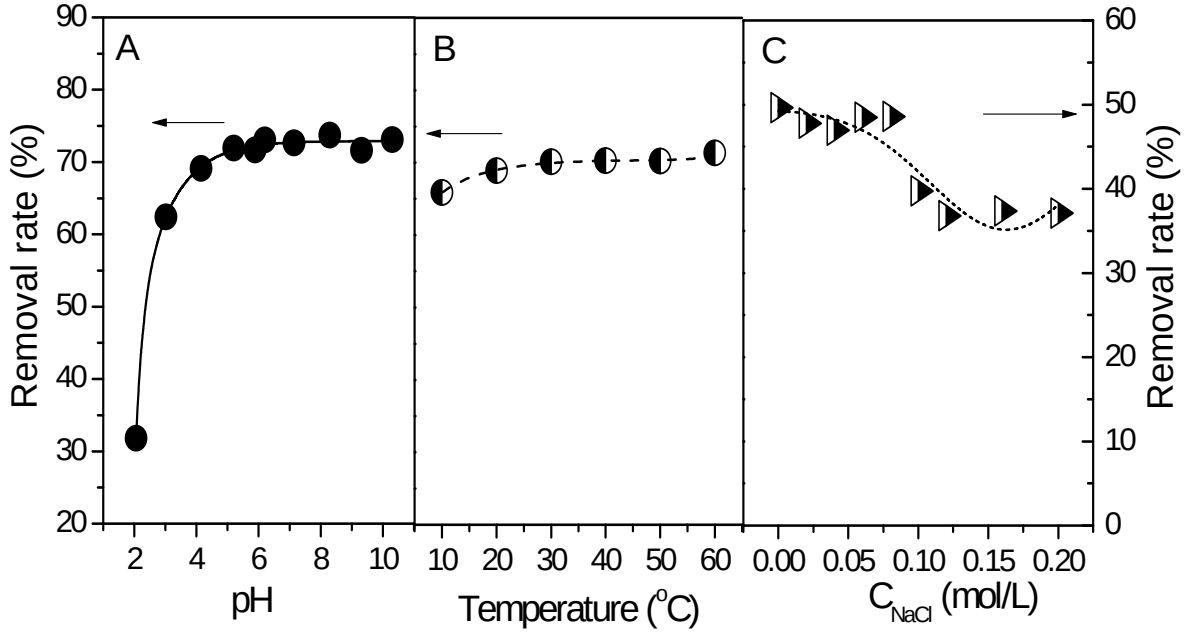

Fig. S16 Effect of pH (A), temperature (B) and NaCl (C) on absorbent CASCA removal rate of CR3R. 50.0 mL of 135 μmol/L (A), 175 μmol/L (B) and 360 μmol/L CR3R (C) and 1.0 g of wet CASCA were oscillated for 3 h in shaking table.

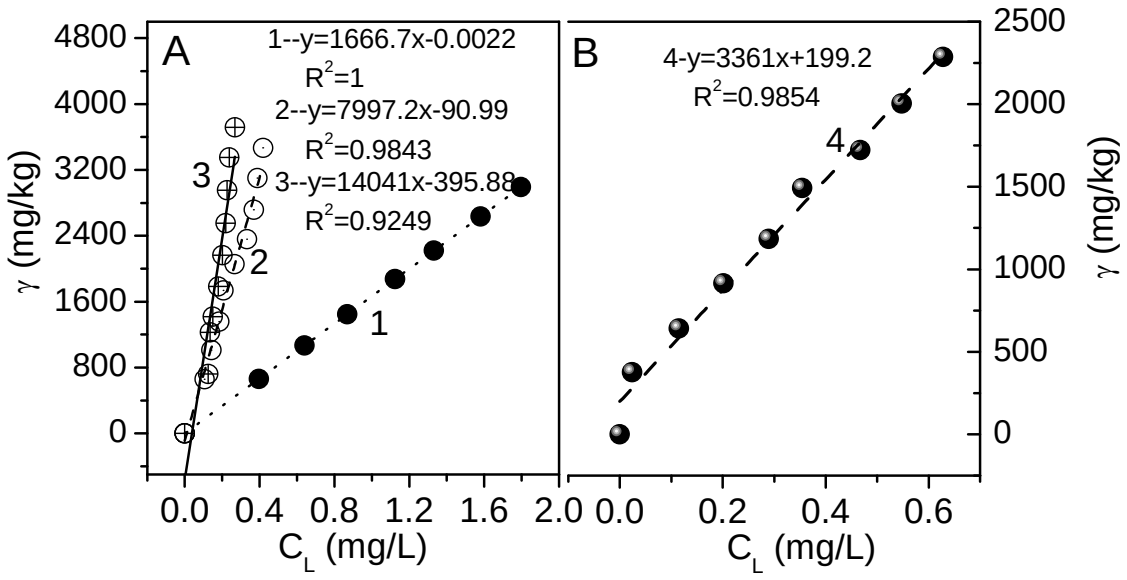

Fig. S17 Adsorptions of PCBs (A) and MC-LR (B). From 1 to 4: PCB029, PCB101, PCB180 and MC-LR. 0.06% CFA was added.

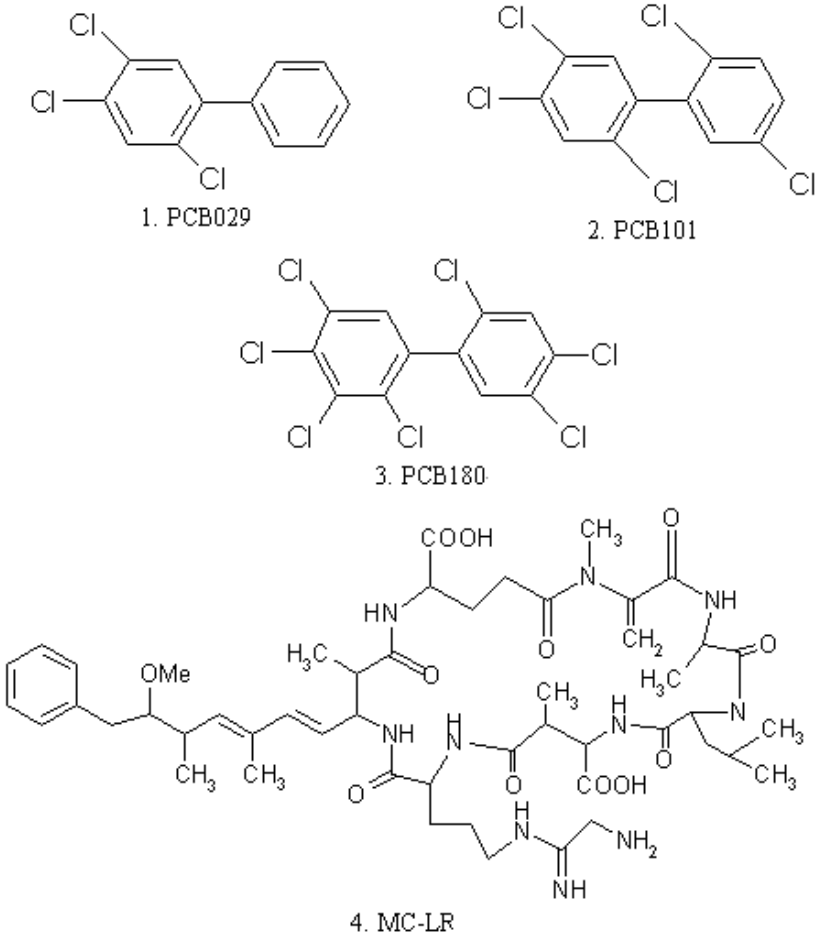

Fig. S18 The chemical structures of PCB029 (1), PCB101 (2), PCB180 (3) and MC-LR (4)

Table S1. Textural parameters of materials

Materials	BET (m2/g)	Pore size (nm)	Pore volume (m3/g)
CFA	42.46	24.62	0.255
CASCA	25.89	24.65	0.156
CA	22.97	3.07	0.017