Supporting Information

Removal of hazardous contaminants from water by natural and zwitterionic surfactant modified clay

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Table S1. Some properties of the zwitterionic surfactant cocamidopropyl betaine and reactive yellow 160 dye.

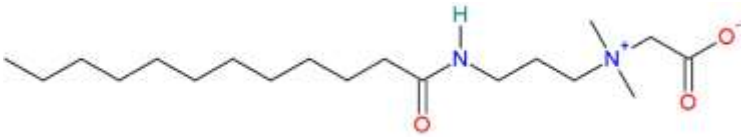
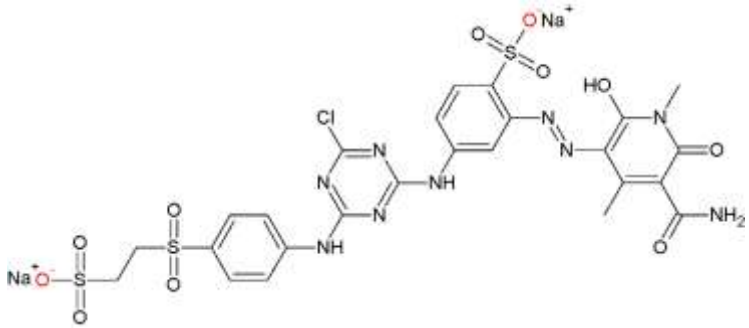
	Cocamidopropyl Betaine (CAPB)	**Reactive yellow 160 dye (RY160)**
Formula	$C_{19}H_{38}N_2O_3$	$C_{25}H_{22}ClN_9Na_2O_{12}S_3$
Structure		
Molar mass	342.52 g/mol	818.12 g/mol

Table S2. The non-linear form of the studied kinetics and equilibrium isotherm models.

Kinetic models	**Equation**	**Parameters**
Pseudo-first-order	$q_t = q_e\,(1 - e^{-k_1 t})$	q_t and q_e (mg/g) are the amount of adsorbate per gram of adsorbent at time t and equilibrium, respectively; k_1 (1/min) is the pseudo-first-order rate constants, and t (min) is the contact time.
Pseudo-second-order	$q_t = \frac{k_2 q_e^2 t}{1 + k_2 q_e t}$	k_2 (g/mg.min) is the pseudo-second-order rate constants.
Isotherm models	**Equation**	**Parameters**
Langmuir	$q_e = \frac{Q_L k_L C_e}{1 + k_L C_e}$, $R_L = \frac{1}{1 + k_L C_i}$	C_e (mg/L) is the concentration of adsorptive at equilibrium, Q_L (mg/g) is the Langmuir theoretical monolayer saturation capacity, k_L (L/mg) is the equilibrium constant and R_L (–) is the separation factor.
Freundlich	$q_e = k_F\, C_e^{1/n}$	k_F (mg$^{(1-1/n)}$L$^{(1/n)}$/g) and n (–) are Freundlich constants
Dubinin–Radushkevich	$q_e = Q_{DR}\, e^{\left[-\beta\left(\mathrm{RT}\ln\left(1+\frac{1}{C_e}\right)\right)^2\right]}$, $E = \frac{1}{\sqrt{-2\beta}}$	Q_{DR} (mg/g) is the D–R maximum adsorption capacity, β (mol^2/J^2) is a constant related to the mean free energy of adsorption, R is the universal gas constant, T (K) is the absolute temperature and E (kJ/mol) is the mean free energy
Temkin	$q_e = \left(\frac{\mathrm{RT}}{b_T}\right) ln A_T C_e$	b_T (–) is constant related to the adsorption heat, and A_T is the Temkin isotherm equilibrium binding constant (L/g)
Redlich–Peterson	$q_e = \frac{k_{RP}\, C_e}{1 + a_{RP}\, C_e^g}$	k_{RP} (L/mg) is constant related to the adsorption capacity, a_{RP} (L/mg) is constant related to the affinity of the binding sites and g (g) is an exponent related to the adsorption intensity.

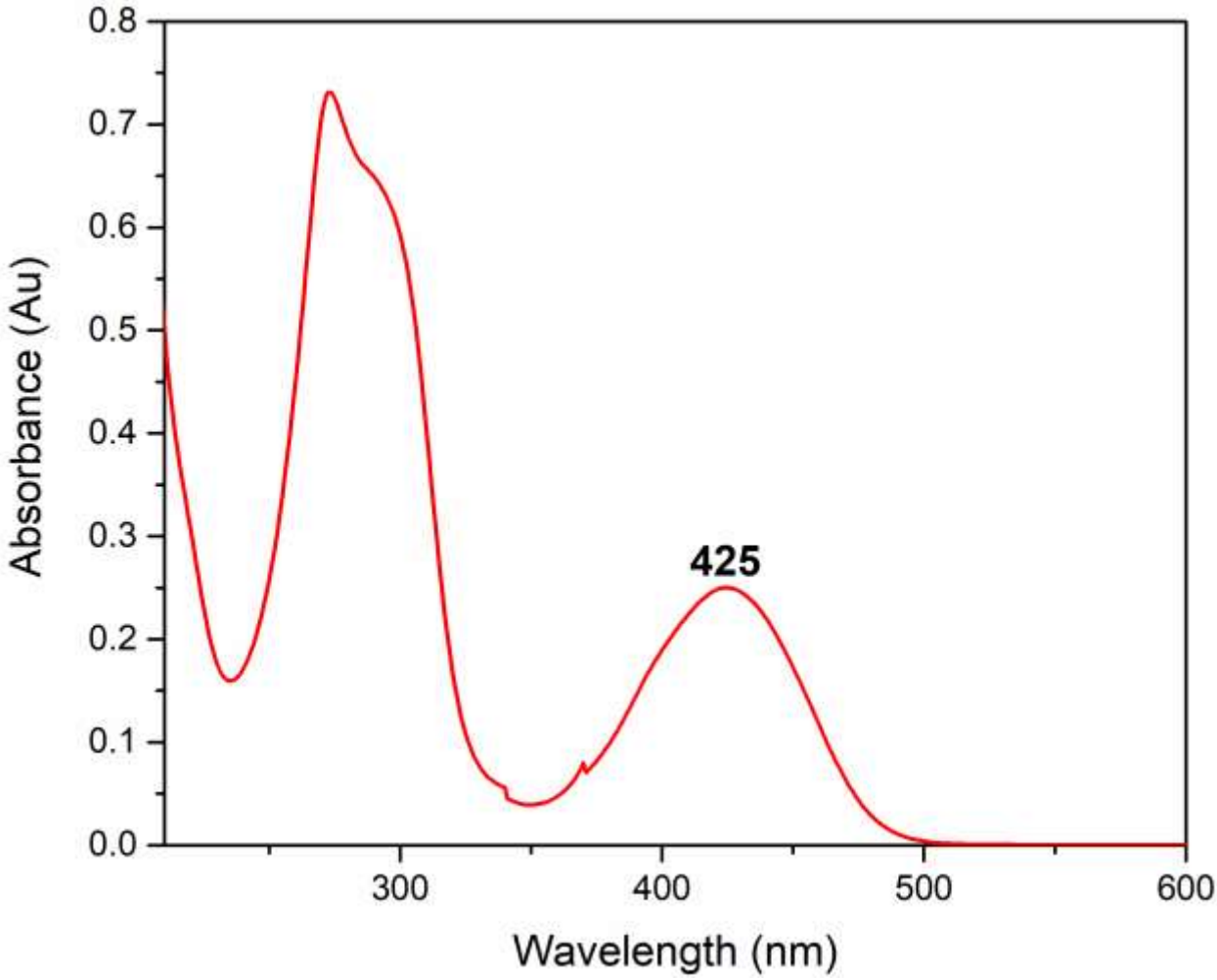


Figure S1. UV-Visible spectrum of the RY160 dye.

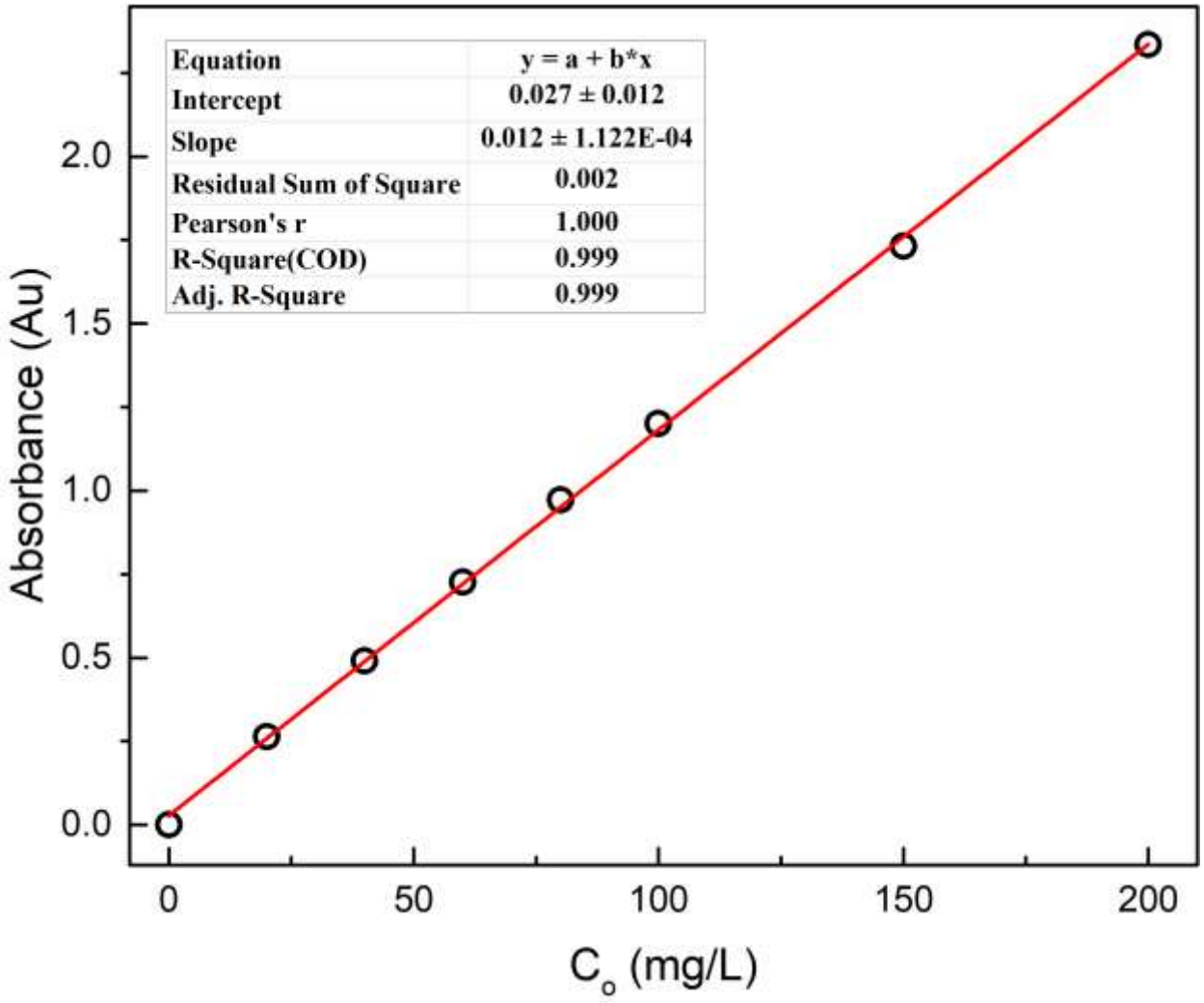


Figure S2. Standard calibration curve of RY160.