**Fig. S1.** The chemical structure of Remazol Black 5 (RB5).

**Fig. S2.** FTIR spectra of (a) perlite (b) perlite treated by HCl (c) Zn (methionine)/perlite.
**Fig. S3.** EDX spectrum of nano-ZnO/expanded perlite.
**Fig. S4.** Nitrogen adsorption (●)/desorption (○) isotherms of nano-ZnO/expanded perlite (a) and perlite (b) at 77 K.
Fig. S5. Effect of pH on first-order and second-order kinetics of color and aromatic fraction removal of RB5 dye by synthesized ZnO/perlite nanocatalyst, initial RB5 conc:100 mg L$^{-1}$; catalyst dosage: 12 g L$^{-1}$.
Fig. S6. Effect of catalyst dosage on color removal (blue column) and removal of aromatic fraction (red column) of RB5 dye. Initial RB5 concentration: 100 mg L$^{-1}$, pH = 11, time: 10 min.