Electronic Supplementary Material (ESI) for RSC Advances.

Electronic Supplementary Information

Fast adsorption and removal of 2-methyl-4-chlorophenoxy acetic acid from aqueous solution with amine functionalized zirconium metal-organic framework

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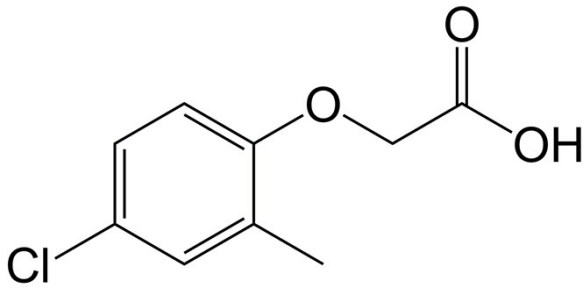
Text S1. Preparation of UiO-66

UiO-66 was synthesized according to the work of Cavka et al.[1] Briefly, $ZrCl_4$ (0.159 g) and terephthalic acid (0.102 g) were well mixed with 20 mL DMF by sonication in a Teflon lined steel autoclave. The autoclave was then placed in a pre-heated oven at 120°C for 24 h. After that, the white solid product of UiO-66 was collected by centrifugation at 8000 rpm for 5 min and washed with DMF for three times. Then, the obtained UiO-66 was soaked in ethanol overnight to exchange the DMF from the cavities of UiO-66. Finally, the solid was dried at 150°C under vacuum overnight and kept in a desiccator.



Scheme S1 Chemical structure of MCPA.

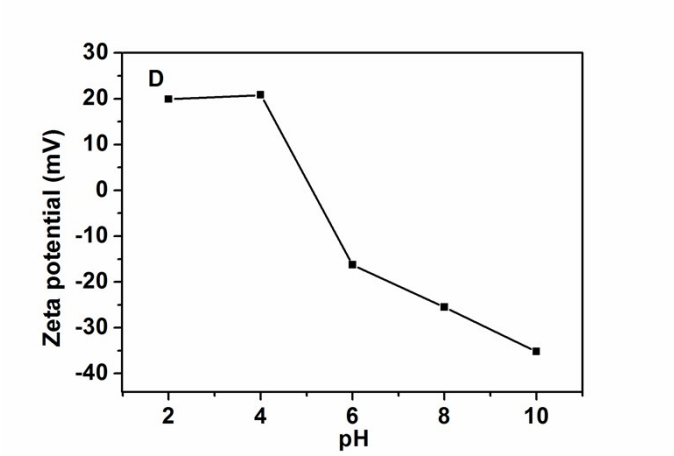


Fig. S1 Zeta potentials of UiO-66-NH_2 in water under various pH at 25°C.

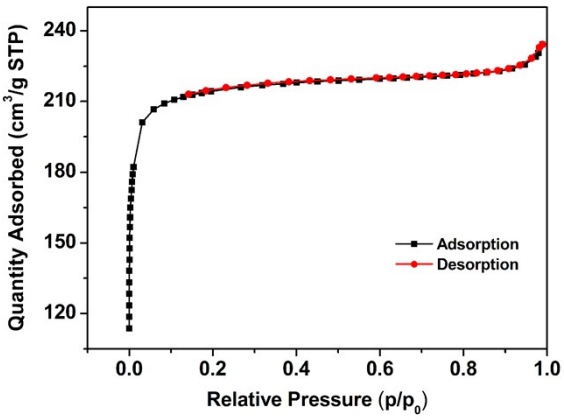


Fig. S2 N_2 adsorption-desorption isotherms of UiO-66-NH_2.

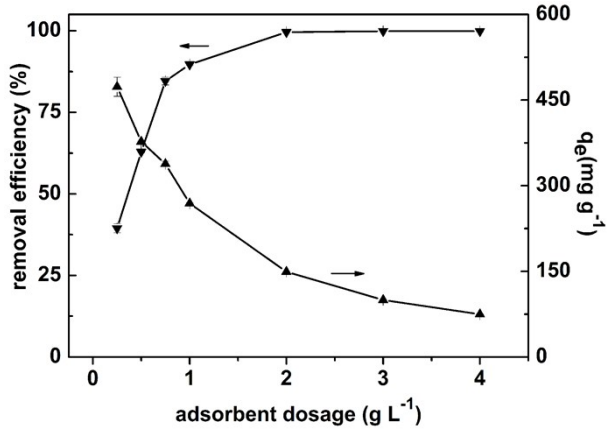


Fig. S3 Effect of adsorbent dosage on the adsorption of MCPA on UiO-66-NH_2.

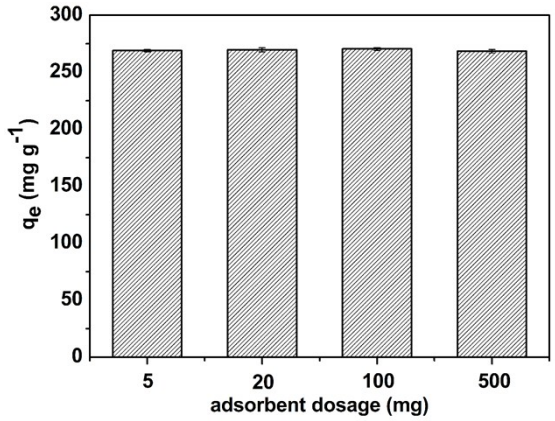


Fig. S4 Effect of scaled up quantities keeping the same ratio

on the adsorption of MCPA on UiO-66-NH_2 (1 g L^{-1} of adsorbent).

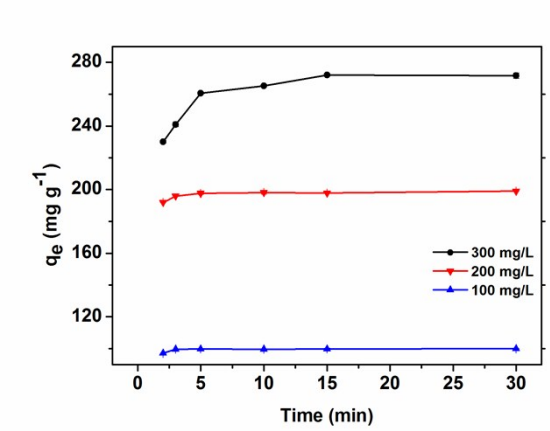


Fig. S5 The adsorption kinetics of MCPA at different initial

concentrations on UiO-66-NH_2 at 25°C and pH 6.0 within 30 min

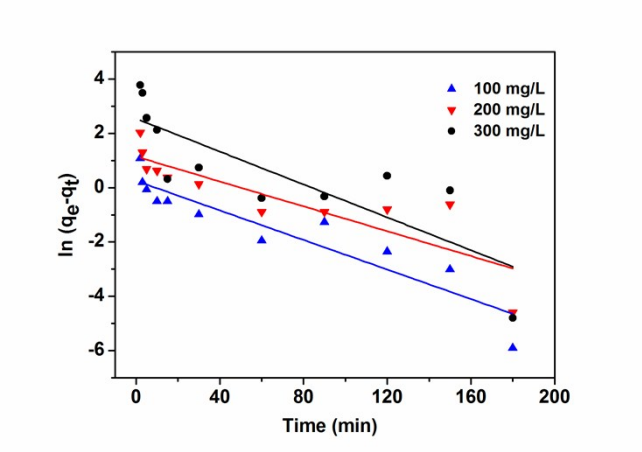


Fig. S6 Plots of pseudo-first-order kinetics for the adsorption of MCPA at different initial concentrations on UiO-66-NH_2 at 25°C and pH 6.0.

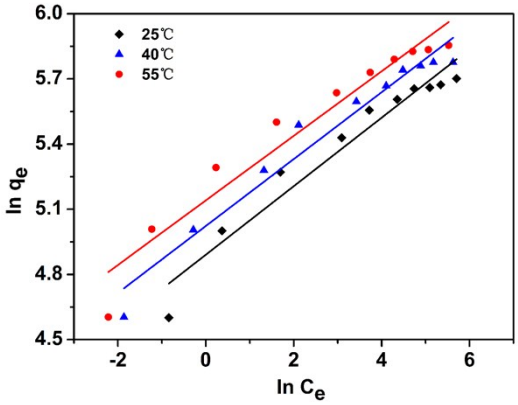


Fig. S7 Linearized Freundlich isotherms for MCPA adsorption by the UiO-66-NH_2 at different temperatures.

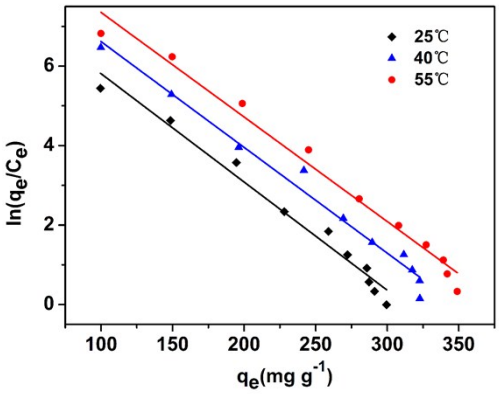


Fig. S8 Plots of ln (q_e/C_e) vs. q_e at various temperatures for the adsorption of MCPA on UiO-66-NH_2.

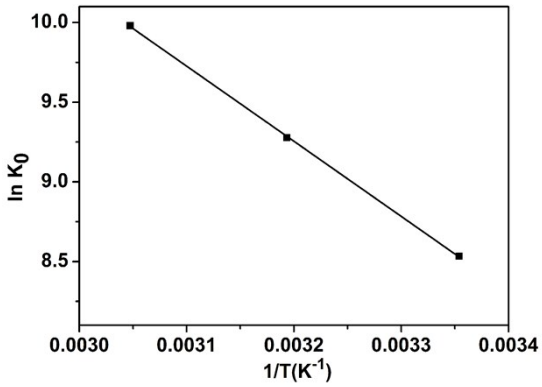


Fig. S9 Plot of $\ln K_0$ against $1/T$ for the adsorption of MCPA on UiO-66-NH_2.

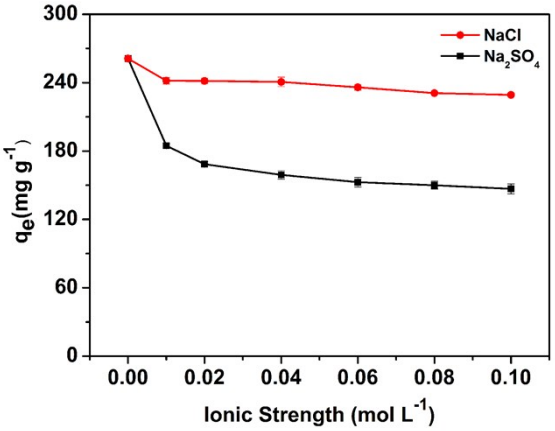


Fig. S10 Effect of ionic strength on the adsorption of MCPA on UiO-66-NH_2

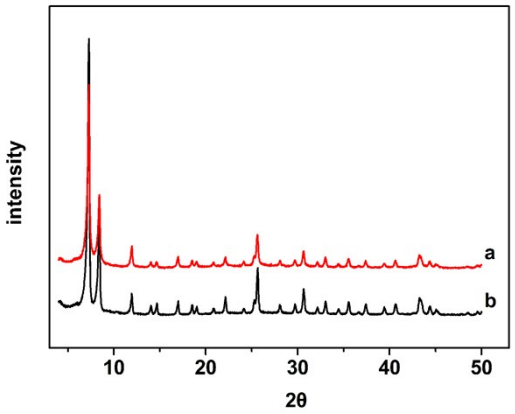


Fig. S11 XRD patterns of (a) regenerated UiO-66-NH_2 after six cycles

(b) as-synthesized UiO-66-NH_2

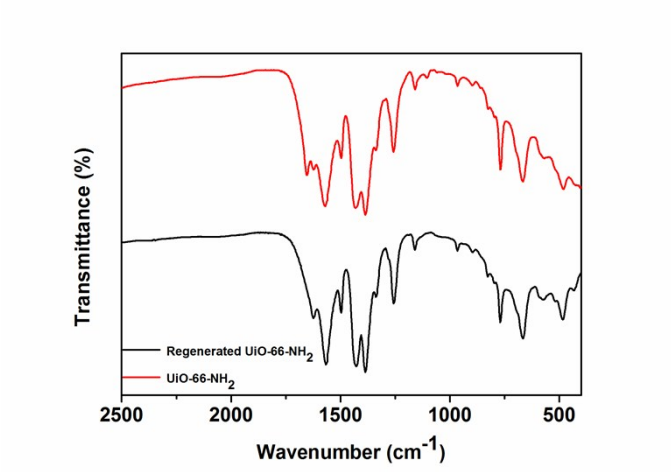


Fig. S12 FT-IR spectra of regenerated UiO-66-NH_2 after six cycles and as-synthesized UiO-66-NH_2

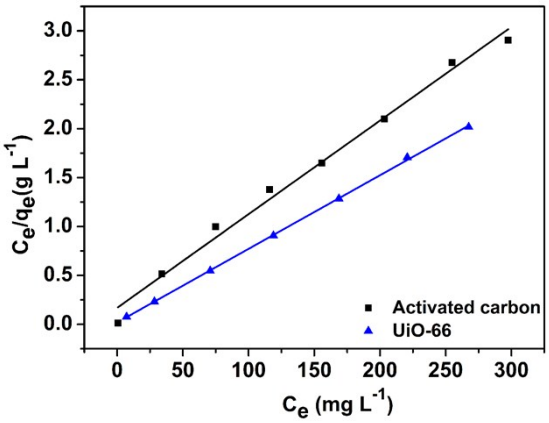


Fig. S13 Linearized Langmuir isotherms for MCPA adsorption by different adsorbents at 25°C.

References

1 J.H. Cavka, S. Jakobsen, U. Olsbye, N. Guillou, C. Lamberti, S. Bordiga and K.P. Lillerud, A new zirconium inorganic building brick forming metal organic frameworks with exceptional stability, *J. Am. Chem. Soc.*, 2008, **130**, 13850.