

## Supplementary Materials

# A Sulfonate Ligand-Defected Zr-Based Metal-Organic Framework for The Enhanced Selective Removal of Anionic Dyes

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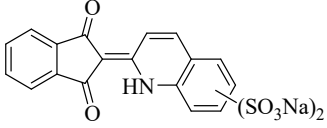
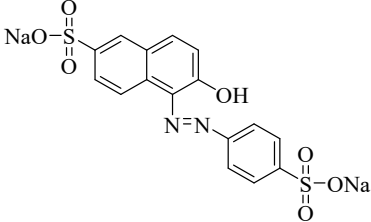
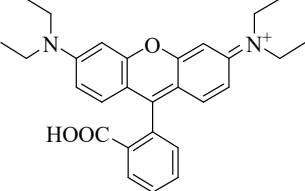
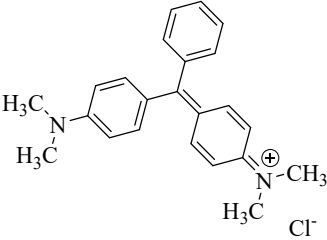
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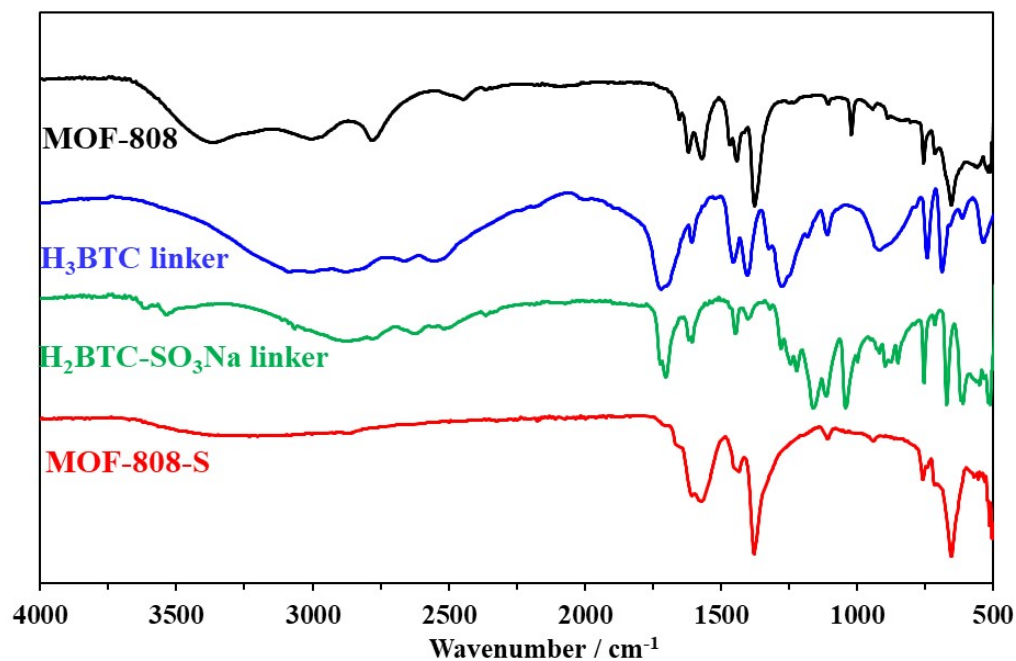
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### Corresponding Authors

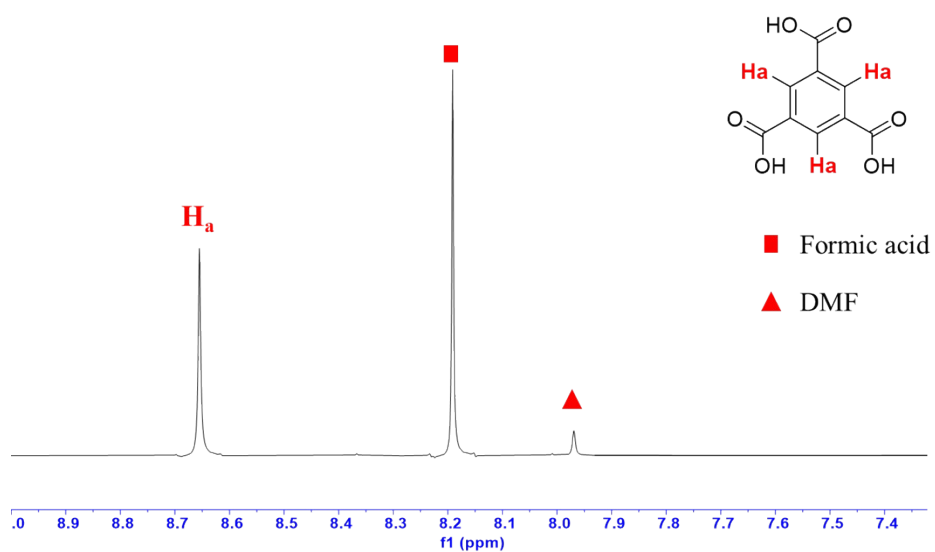
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**Table S1.** Basic information on employed organic dyes

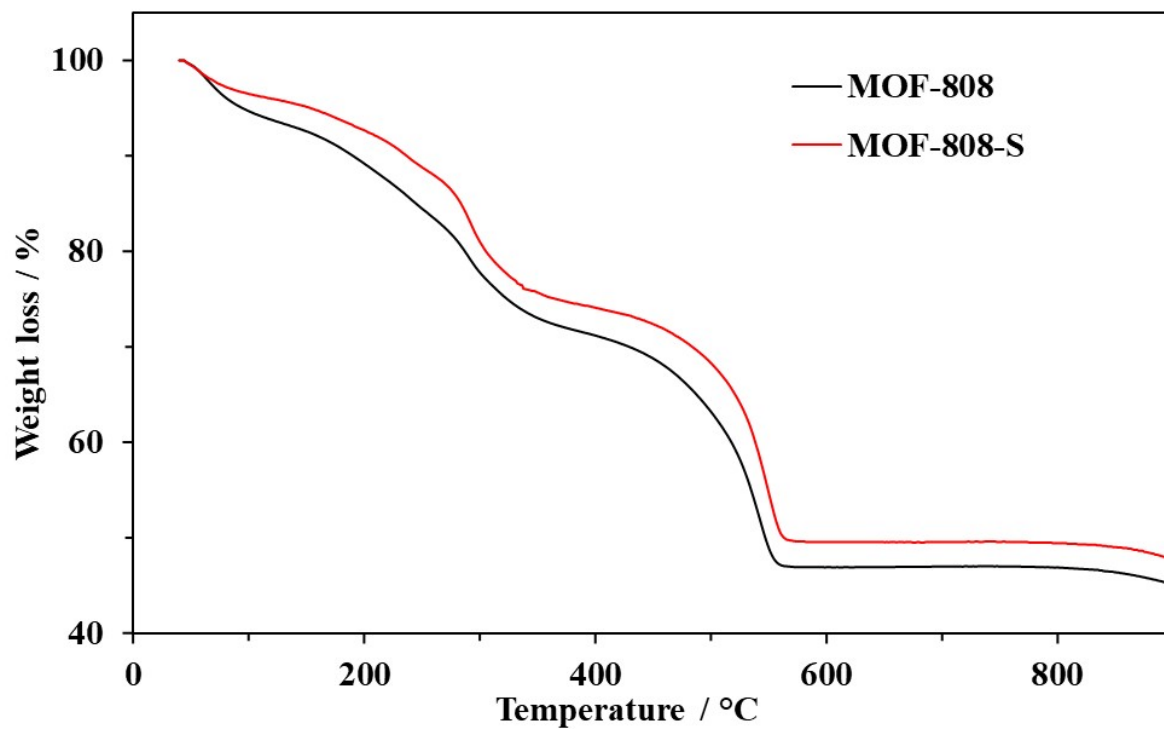
Commercial name	Chemical structure	Absorption ( $\lambda_{\max}$ _nm)
<b>Quinoline Yellow (QY)</b>		<b>440</b>
<b>Sunset Yellow (SY)</b>		<b>482</b>
<b>Rhodamine B (RhB)</b>		<b>555</b>
<b>Malachite Green (MG)</b>		<b>620</b>



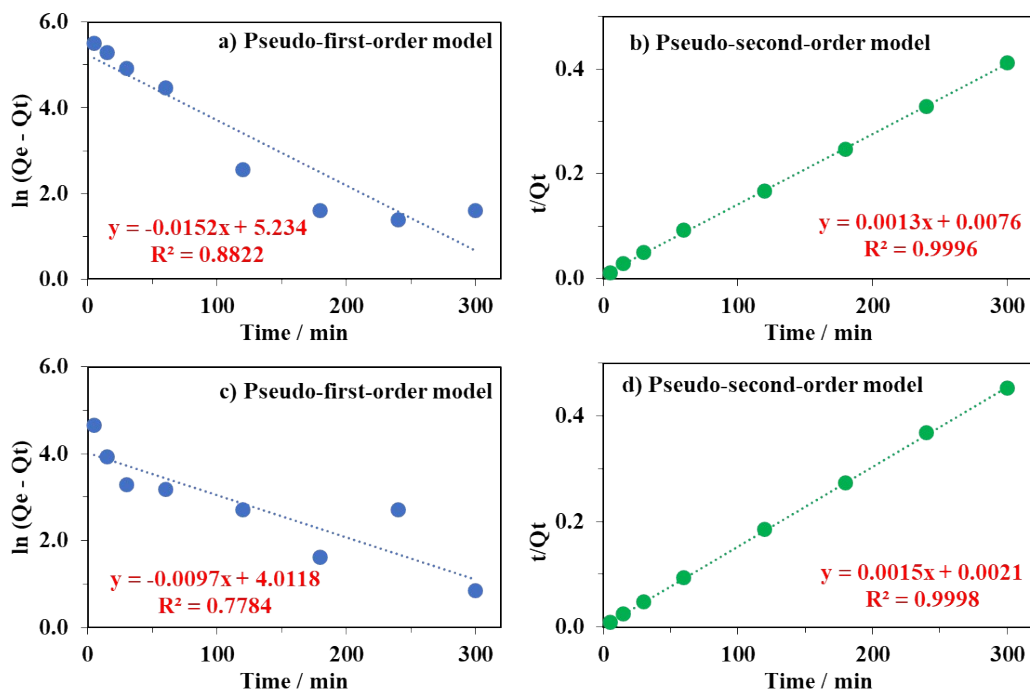
**Figure S1.** FT-IR spectra of pristine MOF-808, H<sub>3</sub>BTC linker, H<sub>2</sub>BTC-SO<sub>3</sub>Na linker, and MOF-808-S.



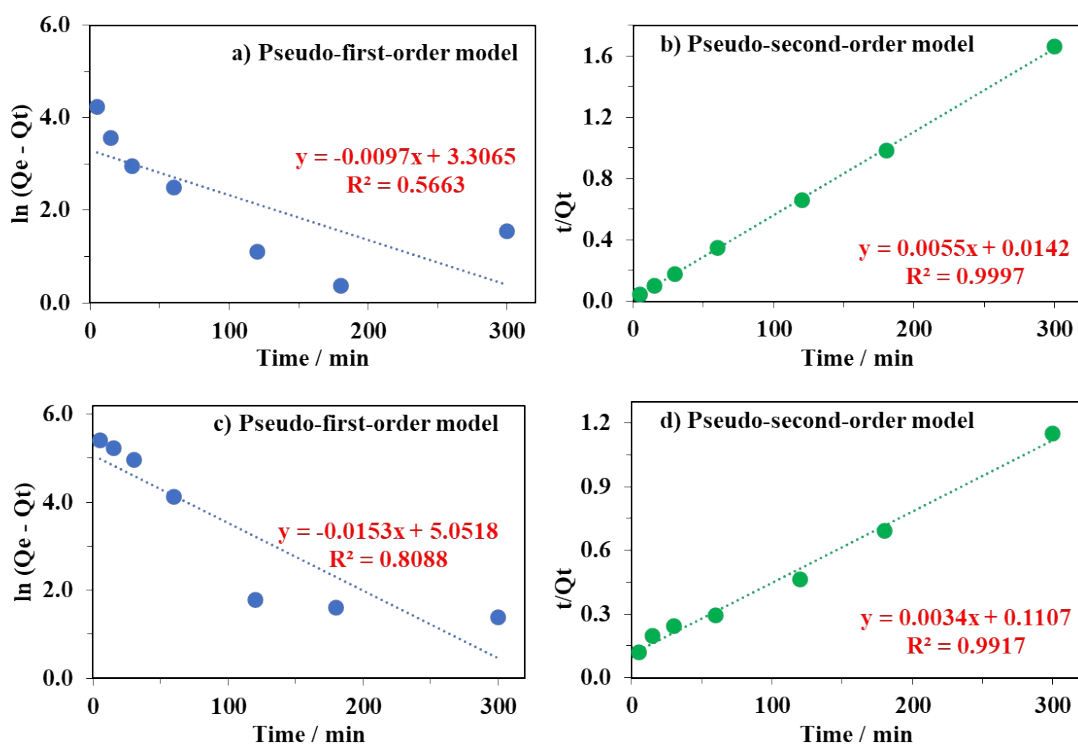
**Figure S2.** <sup>1</sup>H-NMR spectra of digested MOF-808.



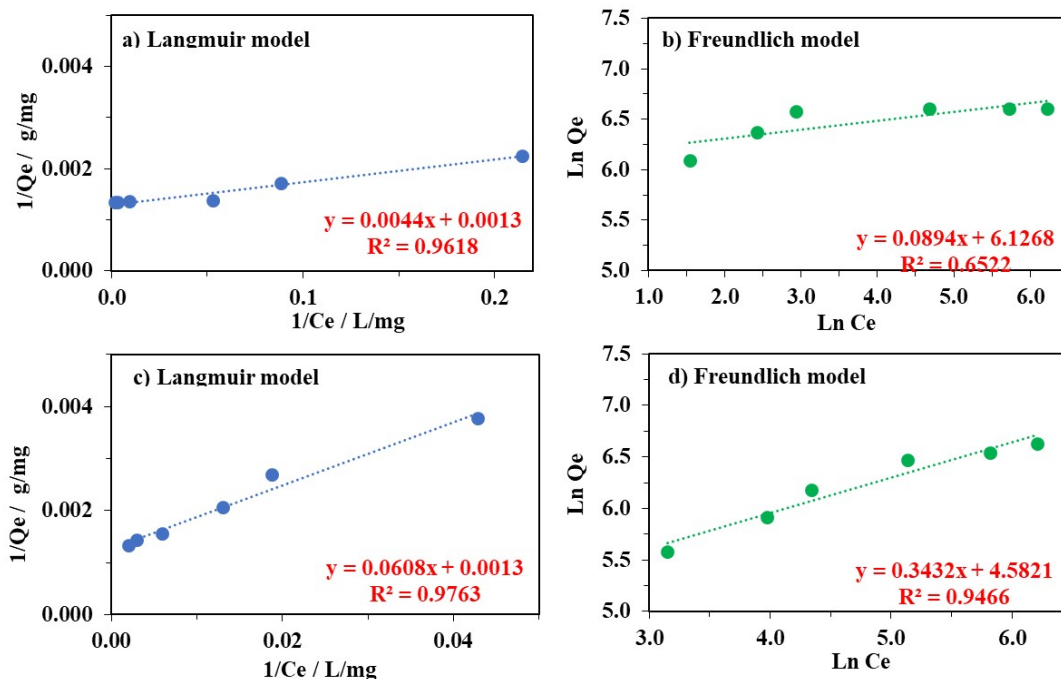
**Figure S3.** TGA profiles of MOF-808 and MOF-808-S.



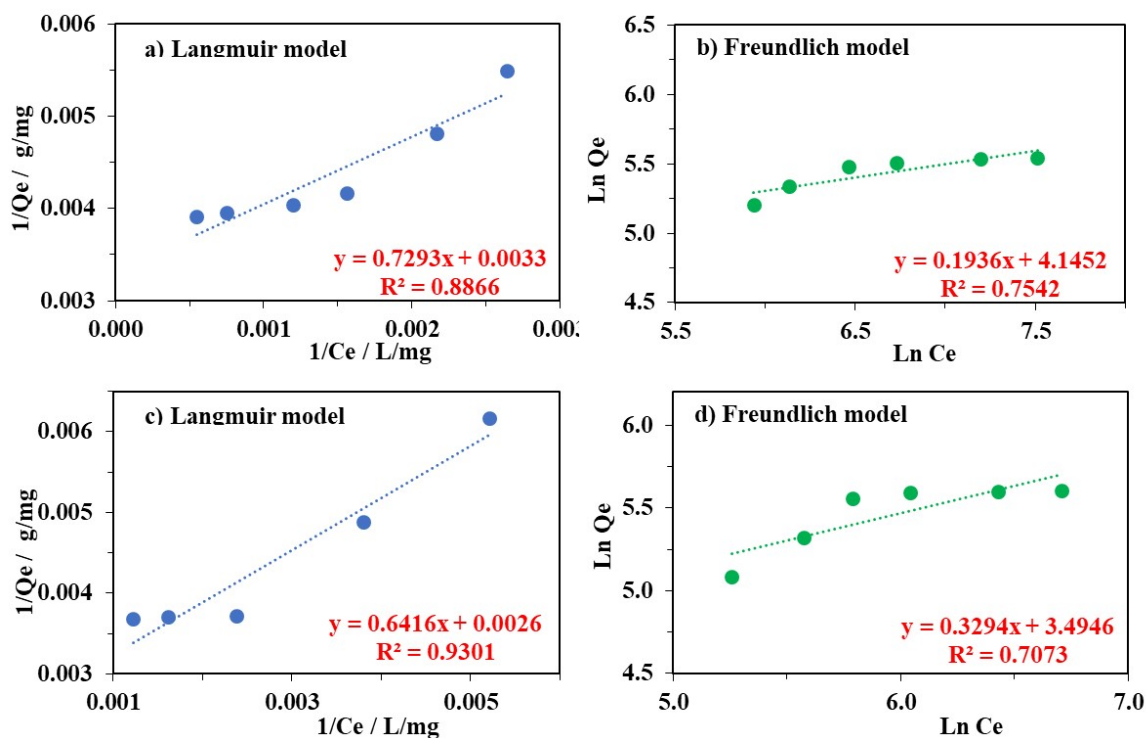
**Figure S4.** Pseudo-first-order and second-order models of the adsorption processes of quinoline yellow (a, b); and sunset yellow (c, d) on MOF-808-S.



**Figure S5.** Pseudo-first-order and second-order models of the adsorption processes of rhodamine B (a, b), and malachite green (c, d) on MOF-808-S.



**Figure S6.** Langmuir and Freundlich models of the adsorption processes of quinoline yellow (a, b); and sunset yellow (c, d) on MOF-808-S.



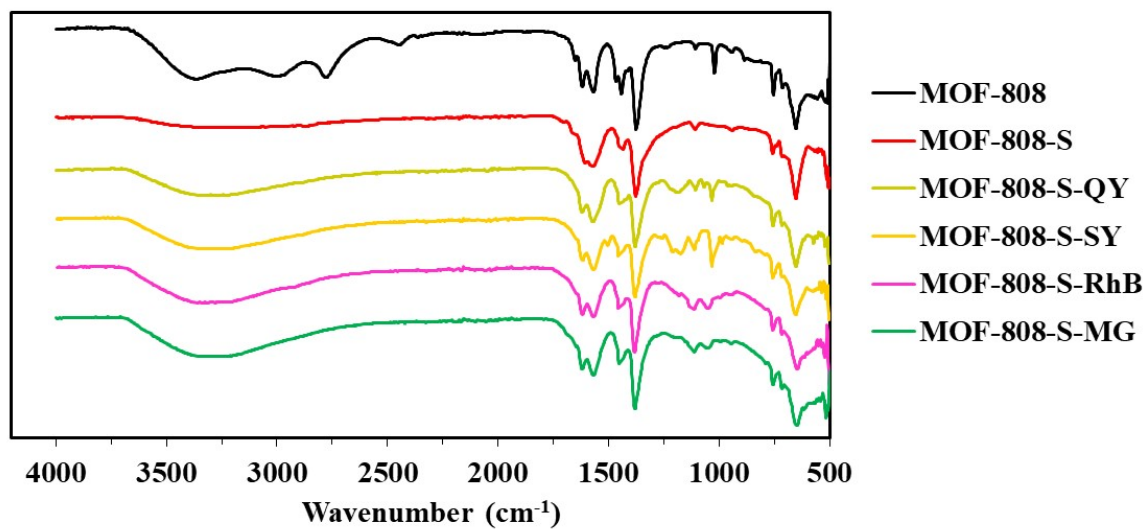
**Figure S7.** Langmuir and Freundlich models of the adsorption processes of rhodamine B (a, b), and malachite green (c, d) on MOF-808-S.

**Table S2.** Coefficients of pseudo first-order and second-order model for the adsorption process based on MOF-808-S.

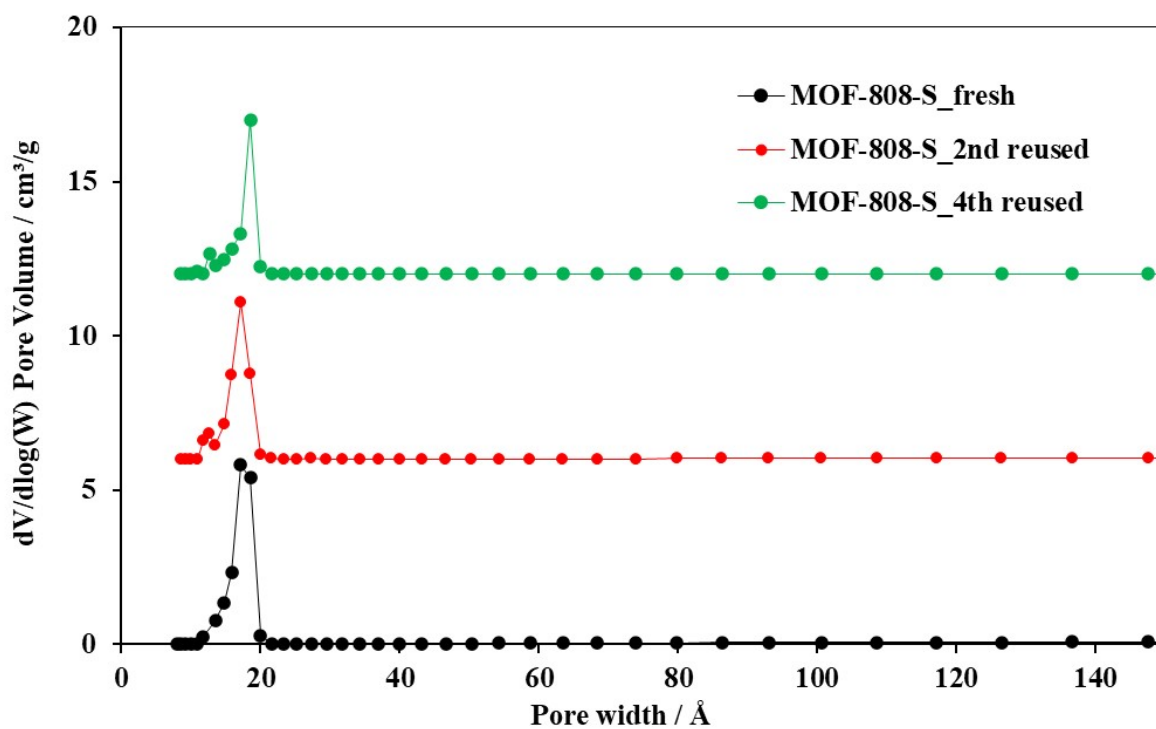
N.	Sample	Pseudo-first-order model			Pseudo-second-order model		
		$Q_{e,cal}$ (mg/g)	$k \cdot 10^{-2}$ (min <sup>-1</sup> )	R <sup>2</sup> (%)	$Q_{e,cal}$ (mg/g)	$k \cdot 10^{-2}$ (g/mg.min)	R <sup>2</sup> (%)
1	<b>QY</b>	187.5	-1.520	88.20	746.5	0.023	99.96
2	<b>SY</b>	55.3	-0.966	77.84	661.4	0.108	99.98
3	<b>RhB</b>	27.3	-0.970	56.63	183.2	0.210	99.97
4	<b>MG</b>	156.3	-1.530	80.88	298.1	0.010	99.18

**Table S3.** Coefficients of Langmuir and Freundlich models for adsorption processes based on MOF-808-S.

N.	Sample	Langmuir model			Freundlich model		
		$K_L$ (L/mg)	$Q_L$ (mg/g)	R <sup>2</sup> (%)	N	$K_F$ (L/g)	R <sup>2</sup> (%)
1	<b>QY</b>	0.297	770.1	96.18	11.2	458.0	65.22
2	<b>SY</b>	0.021	784.6	97.63	2.91	99.7	94.66
3	<b>RhB</b>	0.005	301.2	88.66	5.17	63.1	75.42
4	<b>MG</b>	0.004	383.1	93.01	2.84	27.8	83.05

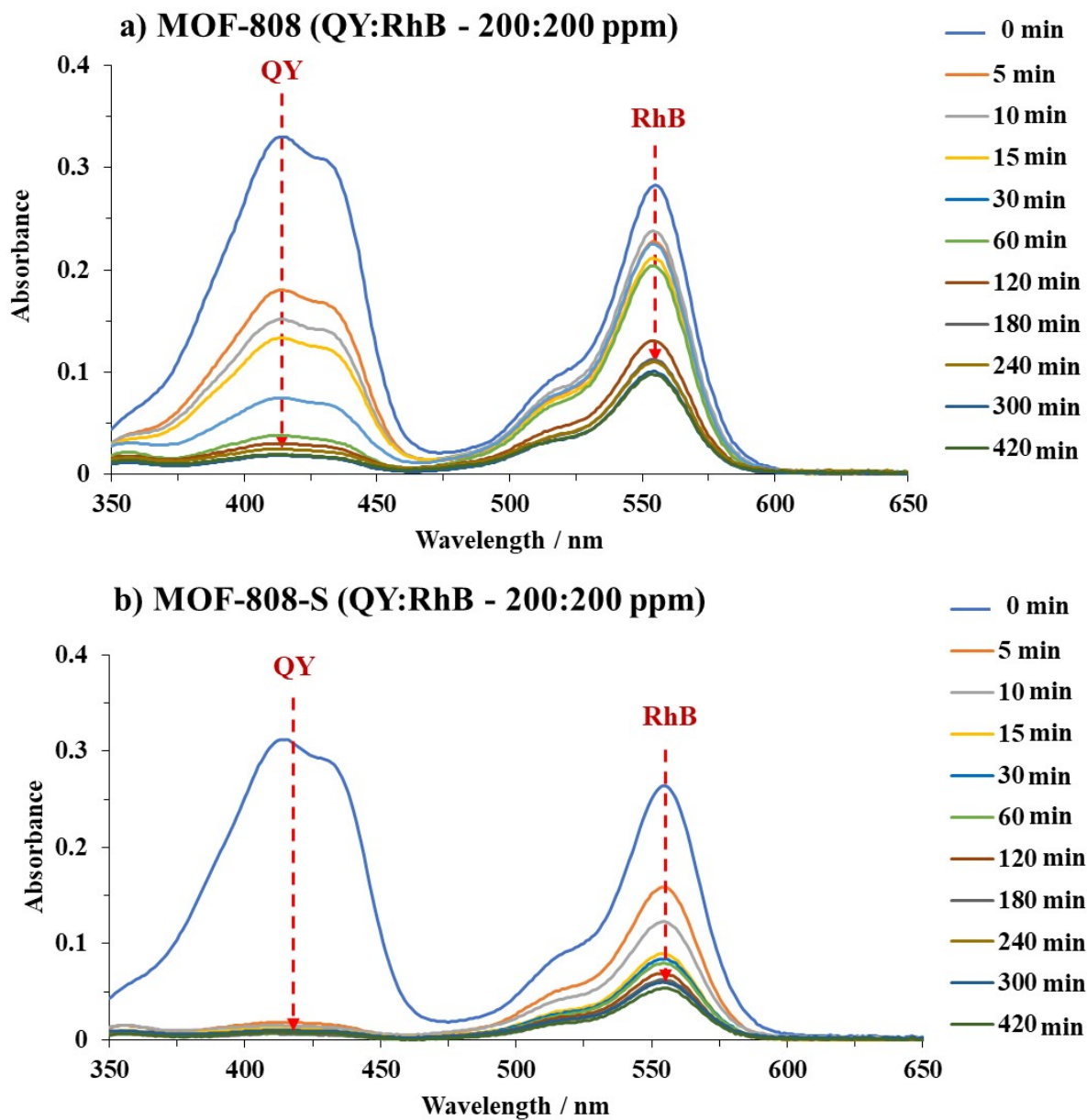


**Figure S8.** FT-IR spectra of the fresh and recovered materials.



**Figure S9.** Pore size distribution of the fresh and reused MOF-808-S.





**Figure S10.** UV-Vis spectra of quinoline yellow-rhodamine B mixtures in the presence of 200 ppm for each dye at various time intervals employing MOF-808 and MOF-808-S as adsorbents