Efficient removal of methylene blue by water-stable anionic coordination polymer in aqueous media

Tuğba Alp Arici [a,*], Melike Şevik [b], Enes Kavak [b], Emrah Kavak [c], Mürsel Arici [b,*]

[a]Department of Chemical Technology, Emet Vocational School, Kütahya Dumlupınar University, 43700, Kütahya, Türkiye

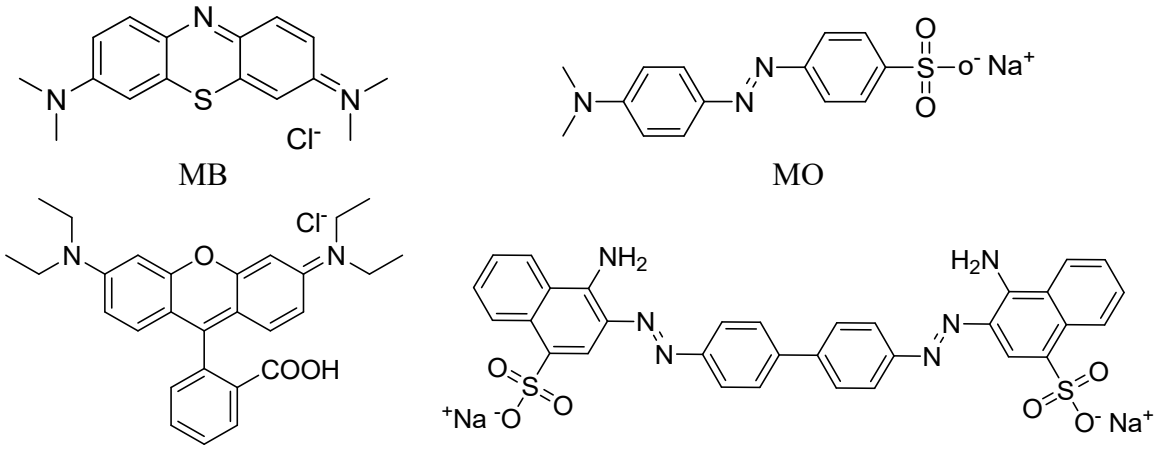
[b]Department of Chemistry, Faculty of Science, Eskişehir Osmangazi University, 26040 Eskişehir, Türkiye

[c]Science and Technology Research and Application Center (BITAM), Necmettin Erbakan University, 42100, Konya, Türkiye

Table S1. Selected bond distances and angles for compound **1** (Å, º)

Bond Distances			
Cd1–O1	2.285 (2)	Cd1–O3^{ii}	2.553 (3)
Cd1–O2	2.636 (3)	Cd1–O4^{ii}	2.302 (2)
Cd1–O6^{i}	2.424 (2)	Cd1–O8^{iii}	2.230 (3)
Cd1–O5^{i}	2.395 (2)		
Bond Angles			
O1–Cd1–O2	52.09 (8)	O4^{ii}–Cd1–O2	137.67 (8)
O1–Cd1–O6^{i}	87.47 (9)	O4^{ii}–Cd1–O6^{i}	93.07 (10)
O1–Cd1–O5^{i}	130.26 (9)	O4^{ii}–Cd1–O5^{i}	122.14 (10)
O1–Cd1–O3^{ii}	137.85 (9)	O4^{ii}–Cd1–O3^{ii}	52.14 (9)
O1–Cd1–O4^{ii}	85.74 (9)	O8^{iii}–Cd1–O1	118.83 (11)
O6^{i}–Cd1–O2	82.68 (9)	O8^{iii}–Cd1–O2	88.86 (10)
O6^{i}–Cd1–O3^{ii}	95.47 (11)	O8^{iii}–Cd1–O6^{i}	137.92 (9)
O5^{i}–Cd1–O2	88.98 (9)	O8^{iii}–Cd1–O5^{i}	84.75 (9)
O5^{i}–Cd1–O6^{i}	54.09 (8)	O8^{iii}–Cd1–O3ii	85.93 (12)
O5^{i}–Cd1–O3^{ii}	82.00 (10)	O8^{iii}–Cd1–O4^{ii}	119.30 (10)
O3^{ii}–Cd1–O2	169.95 (8)		

Symmetry codes: (i) x−1, y−1, z−1; (ii) x, y−1, z; (iii) x, y−1, z−1.



Scheme S1. The molecular structures of the dyes used in adsorption

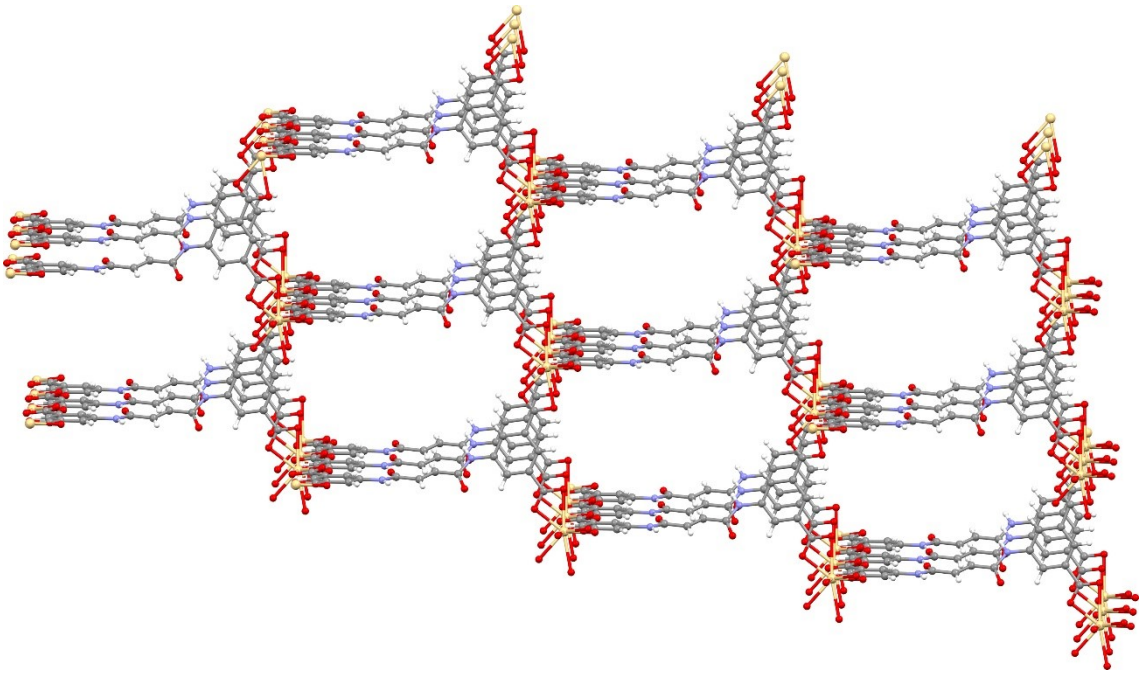


Fig. S1. A single 3D framework of 1 along the a-axis

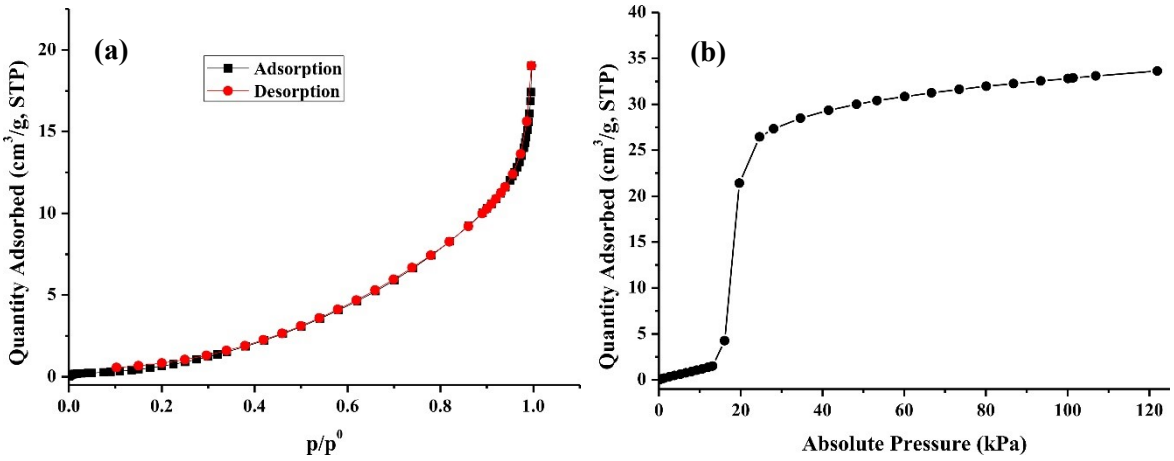


Fig. S2. (**a**) N_2 adsorpstion-desorption isotherms of the compound at 77 K (**b**) CO_2 adsorption isotherm of the compound at 273 K

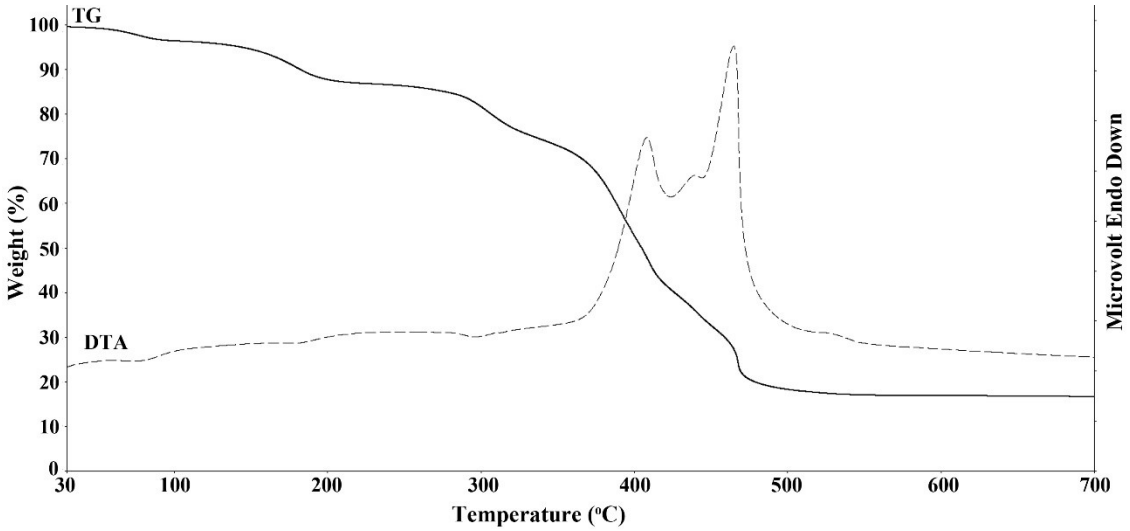


Fig. S3. TG/DTA curves of the compound

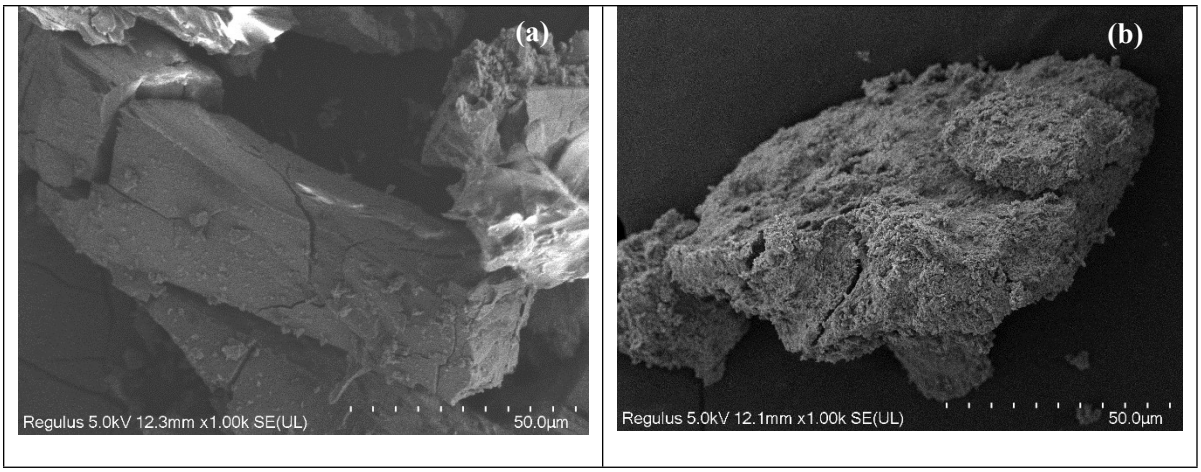


Fig. S4. SEM images of the compound before (a) and after MB adsorption.

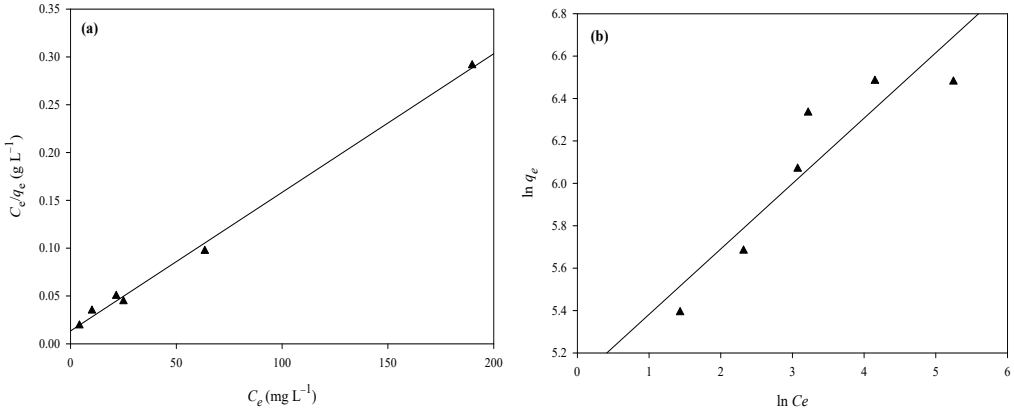


Fig. S5. Langmuir isotherm model (a) and Freundlich isotherm model (b) plots for the adsorption of MB.

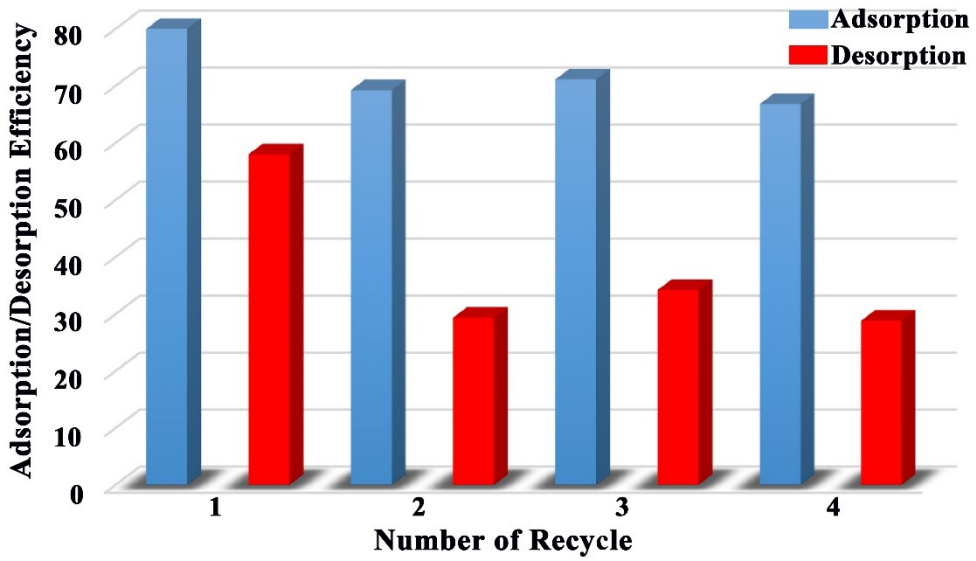


Fig. S6. The bar graphic of adsorption/desorption efficiency versus recycling times for MB

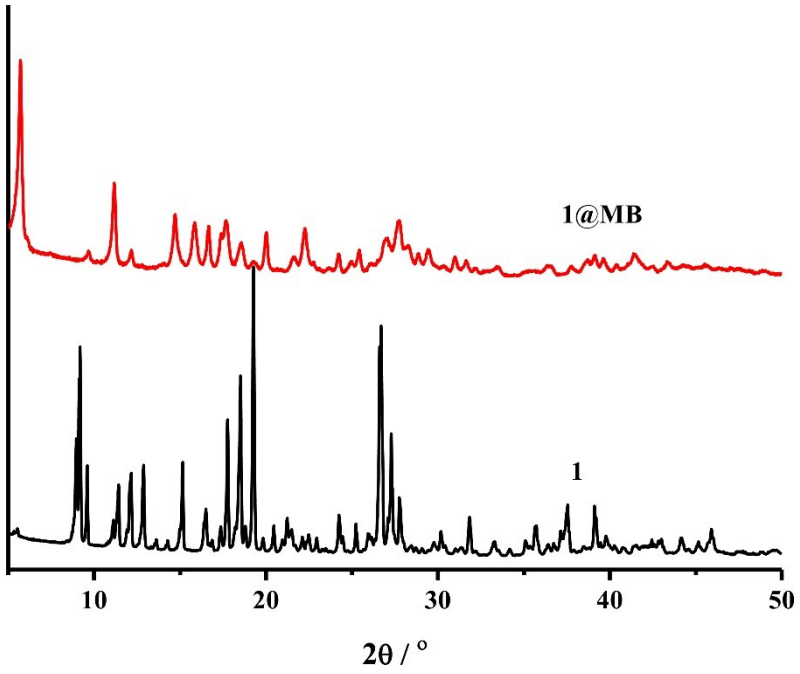


Fig. S7. PXRD patterns of the compound before and after MB adsorption

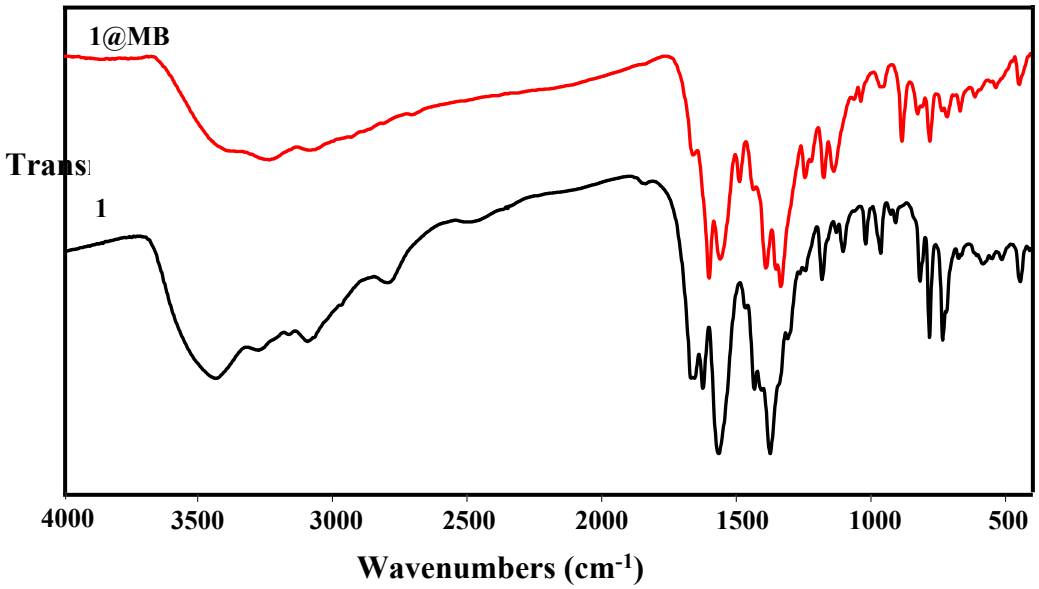


Fig. S8. FT-IR spectra of the compound before and after MB adsorption

Table S2. Comparison of maximum adsorption capacity of various adsorbents for MB.

Adsorbent	q_{max} (mg g^{-1})	
Er-MOF	494.1	[1]
MoS_2-COOH@ UiO-66-NH_2	253	[2]
UiO-66-NH_2	549.6	[3]
Cu-BTC@AG	282.466	[4]
Magnetic Fe_3O_4/PVA/CA/UiO-67 nanospheres	1371.79	[5]
Fe_3O_4@SiO_2@HKUST-1 (composite-1)	434.78	[6]
NH_2-MIL-101 (Al)	762	[7]
Cd(II)-MOF	1004.12	[8]
Compound 1	689.93	**This work**

References

1 M. Jiang, P.-L. Zhao, Y.-N. Yue, X.-Q. Song and L. Wang, *J. Mol. Struct.*, 2024, 138943.

2 K. Karami, P. Bayat, S. Javadian and M. Saraji, *J. Mol. Liq.*, 2021, **342**, 117520.

3 S.-W. Lv, J.-M. Liu, H. Ma, Z.-H. Wang, C.-Y. Li, N. Zhao and S. Wang, *Microporous Mesoporous Mater.*, 2019, **282**, 179–187.

4 Q. Fu, D. Shi, C. Mo, J. Lou, S. Zhou, L. Zha, J. Wang, W. Yan and J. Luo, *J. Solid State Chem.*, 2022, **311**, 123100.

5 Z. Jing, Y. Li, Q. Du, X. Pi, Y. Wang, S. Zhao and Y. Jin, *Int. J. Biol. Macromol.*, 2023, **253**, 126967.

6 N. Faaizatunnisa, R. Ediati, H. Fansuri, H. Juwono, S. Suprapto, A. R. P. Hidayat and L. L. Zulfa, *Nano-Structures \& Nano-Objects*, 2023, **34**, 100968.

7 F. Ahmadijokani, R. Mohammadkhani, S. Ahmadipouya, A. Shokrgozar, M. Rezakazemi, H. Molavi, T. M. Aminabhavi and M. Arjmand, *Chem. Eng. J.*, 2020, **399**, 125346.

8 M. Şevik, S. M. Sezdi, E. Kavak, T. A. Arici and M. Arici, *Cryst. Growth Des.*, 2023, **23**, 5163–5172.