

Supplementary Information

Synthesis of Zeolite-A/MOF-5 Composite for the Defluoridation of Groundwater

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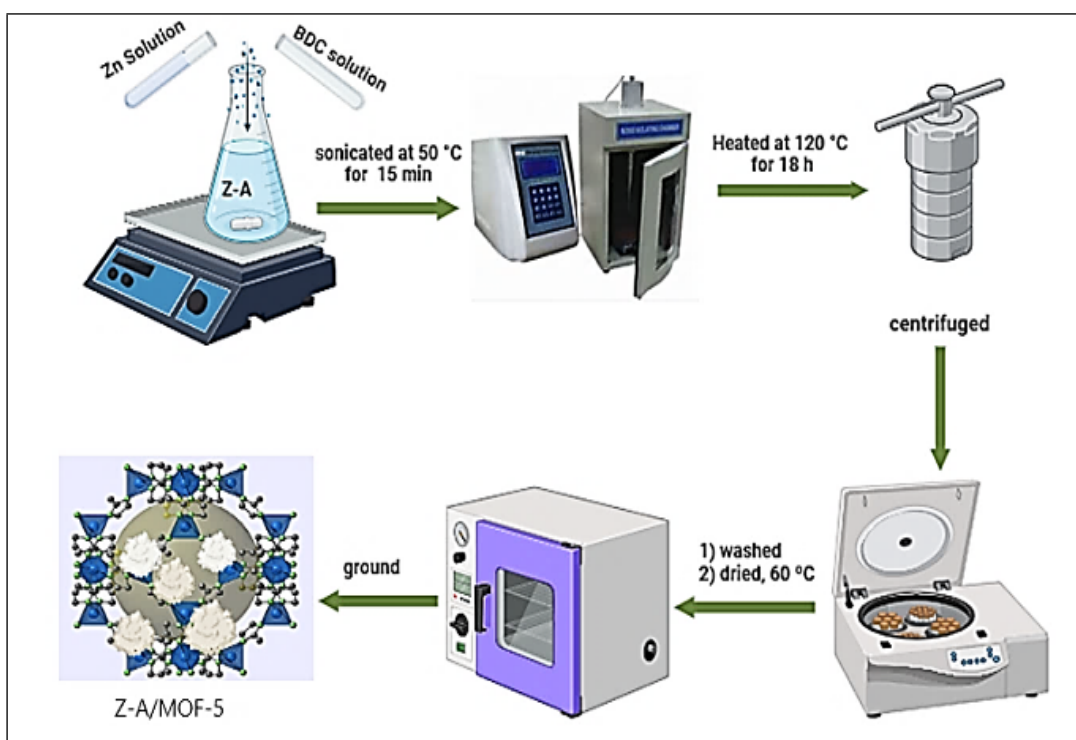


Fig. S1 Synthesis of Z-A/MOF-5 composite by solvothermal method.

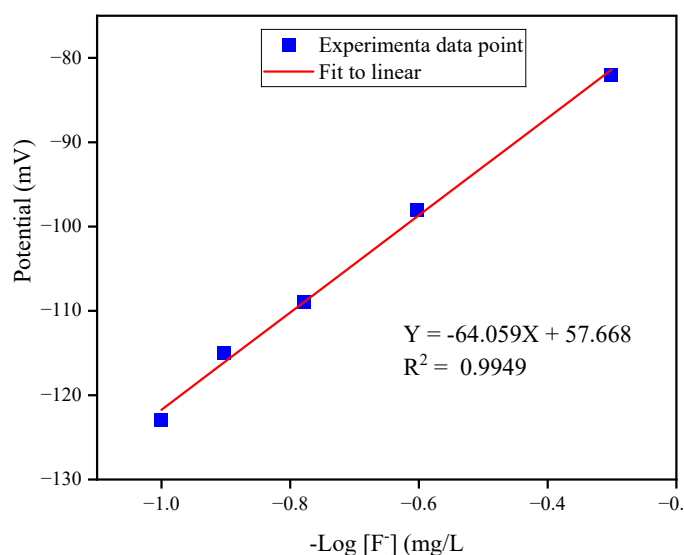


Fig. S2 Calibration curve of F⁻ standard solutions.

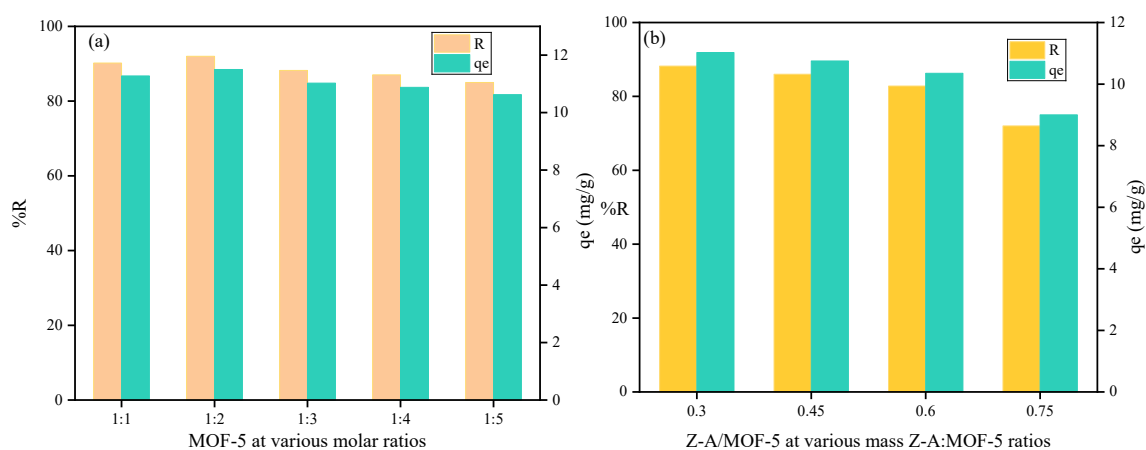


Fig. S3 Preliminary defluoridation efficiency and capacity of synthesized (a) MOF-5 and (b) Z-A/MOF-5 adsorbents.

Table S1 Physicochemical properties of groundwater samples were collected from Ziway, and Kenteri town, Ethiopia.

S. No	Parameter	Before adsorption		After adsorption	
		Ziway	Kenteri	Ziway	Kenteri
1	SO ₄ ²⁻ (mg/L)	5.00	4.80	3.10	2.52
2	pH	6.8	7.5	7.8	7.6
3	NH ₃ (mg/L)	0.67	1.54	0.62	1.21
4	NO ₃ ⁻ (mg/L)	1.90	2.82	1.68	2.45
5	Cl ⁻ (mg/L)	337.00	136.74	141.00	127.86
6	F ⁻ (mg/L)	8.50	12.25	0.57	0.99
7	PO ₄ ³⁻ (mg/L)	4.15	5.94	2.89	4.00
8	CO ₃ (mg/L)	1.29	1.40	0.54	0.35

Table S2 Result for Pseudo-first-order and pseudo-second-order model

Pseudo-first-order			Pseudo-second-order			
Qm. fit (mg/g)	K _i (hr ⁻¹)	R ²	Qm. fit (mg/g)	Qm. exp(mg/g)	R ²	K ₂ (g mg ⁻¹ hr ⁻¹)
1.23373	0.00229	0.85189	11.334	10.725	0.9994	0.203145

Table S3 Result for Langmuir isotherm and Freundlich adsorption isotherm model

Langmuir model			Freundlich model		
Qm (mg/g)	K _L (L/mg)	R ²	K _F	1/n	R ²
97.943	0.047146	0.83782	5.87016	0.84742	0.9956

Table S4 A number of runs applied using the Box-Behnken quadratic model in RSM

Std	Run	Factor 1	Factor 2	Factor 3	Response 1
		A:Dose g/L	B:Time h	C:Co mg/L	R %
2	1	2	3	22.5	84.98
11	2	1.2	3	40	76.07
17	3	1.2	13.5	22.5	85.89
3	4	0.4	24	22.5	84.07
12	5	1.2	24	40	78.28
8	6	2	13.5	40	78.98
9	7	1.2	3	5	86.08
6	8	2	13.5	5	88.56
14	9	1.2	13.5	22.5	85.89
7	10	0.4	13.5	40	74.72
13	11	1.2	13.5	22.5	85.89
1	12	0.4	3	22.5	80.92
10	13	1.2	24	5	89.54
5	14	0.4	13.5	5	84.78
4	15	2	24	22.5	87.96
16	16	1.2	13.5	22.5	85.89
15	17	1.2	13.5	22.5	85.89