Supplementary Information

A Novel Approach for the Determination of Sorption Equilibria and Sorption Enthalpy Used for MOF Aluminium Fumarate with Water

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S1 General description of the sorption equilibrium of aluminium fumarate

In order to calculate X for any T and p the Clausius–Clapeyron approach for the isostere can be used to calculate the pressure $p_{40°C}$ at 40 °C on the same isostere:

$$\ln p_{40°C}(X) = \ln p(X) - \frac{\Delta h_s}{R}\left(\frac{1}{313.15\ \mathrm{K}} - \frac{1}{T}\right) \qquad \text{(S1)}$$

With $p_{\mathrm{rel}} = \frac{p_{40°C}}{p_{\mathrm{sat}(40\ °C)}}$ the loading X can then be looked up in Table S1. Based on our results the adsorption enthalpy can be assumed constant with a value of 51.2 kJ/mol.

To calculate the loading per mass of pure adsorbent the average adsorbent content of 0.77 $\mathrm{kg_s/kg_{cmp}}$ may be used (Table S1).

Table S1. Interpolated values of the 40-°C-isotherm of the coated samples.

p_{rel}	X_{eff} (kg/kg$_{\mathrm{cmp}}$)	p_{rel} (cnt.)	X_{eff} (kg/kg$_{\mathrm{cmp}}$)	p_{rel} (cnt.)	X_{eff} (kg/kg$_{\mathrm{cmp}}$)
0	0	0.17	0.03328	0.34	0.24247
0.01	0.00200	0.18	0.03513	0.35	0.24550
0.02	0.00400	0.19	0.03698	0.36	0.24745
0.03	0.00600	0.2	0.03880	0.37	0.24882
0.04	0.00800	0.21	0.04060	0.38	0.25010
0.05	0.00999	0.22	0.04325	0.39	0.25148
0.06	0.01198	0.23	0.04982	0.4	0.25297
0.07	0.01396	0.24	0.06210	0.41	0.25455
0.08	0.01594	0.25	0.08067	0.42	0.25621
0.09	0.01791	0.26	0.10608	0.43	0.25793
0.1	0.01987	0.27	0.13797	0.44	0.25971
0.11	0.02182	0.28	0.16640	0.45	0.26153
0.12	0.02376	0.29	0.18856	0.46	0.26339
0.13	0.02569	0.3	0.20681	0.47	0.26526
0.14	0.02761	0.31	0.22102	0.48	0.26714
0.15	0.02951	0.32	0.23109	0.49	0.26902
0.16	0.03140	0.33	0.23787	0.5	0.27090