Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Supporting materials

Gel self-assembly of lanthanum aminopolycarboxylates with skeleton structures and adsorptions of gases

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Figure and Table Options

Table S1. Bond valence calculations for $[La(Hida)_2(H_2O)_2]_n \cdot nCl \cdot 4nH_2O$ (**1**), $K_{2n}[La(nta)_2]_n \cdot nH_2O$ (**2**) and $(H_2en)_n[La(edta)(H_2O)]_{2n} \cdot 10nH_2O$ (**3**).
Table S2. Adsorption data of O_2, CO_2, CH_4, N_2, H_2 and desorption data of O_2 (mg/g) of $(H_2en)_n[La(edta)(H_2O)]_{2n} \cdot 10nH_2O$ (**3**) at 298 K under different pressure respectively.
Table S3. Adsorption data of O_2, CO_2, CH_4, N_2, H_2 and desorption data of O_2, CO_2 (mg/g) of $\{La(H_2O)_4[La(1,3\text{-}pdta)(H_2O)]_3\}_n \cdot 11.25nH_2O$ (**4**) at 298 K under different pressure respectively.
Table S4. Solid state ^{13}C NMR data for $[La(Hida)_2(H_2O)_2]_n \cdot nCl \cdot 4nH_2O$ (**1**), $K_{2n}[La(nta)_2]_n \cdot nH_2O$ (**2**) and $(H_2en)_n[La(edta)(H_2O)]_{2n} \cdot 10nH_2O$ (**3**).
Table S5. Crystallographic data and structural refinements for $[La(Hida)_2(H_2O)_2]_n \cdot nCl \cdot 4nH_2O$ (**1**), $K_{2n}[La(nta)_2]_n \cdot nH_2O$ (**2**) and $(H_2en)_n[La(edta)(H_2O)]_{2n} \cdot 10nH_2O$ (**3**).
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Figure S1. 2D layered structure of $[La(Hida)_2(H_2O)_2]_n \cdot nCl \cdot 4nH_2O$ (**1**) viewed along *a* and *b* axis.

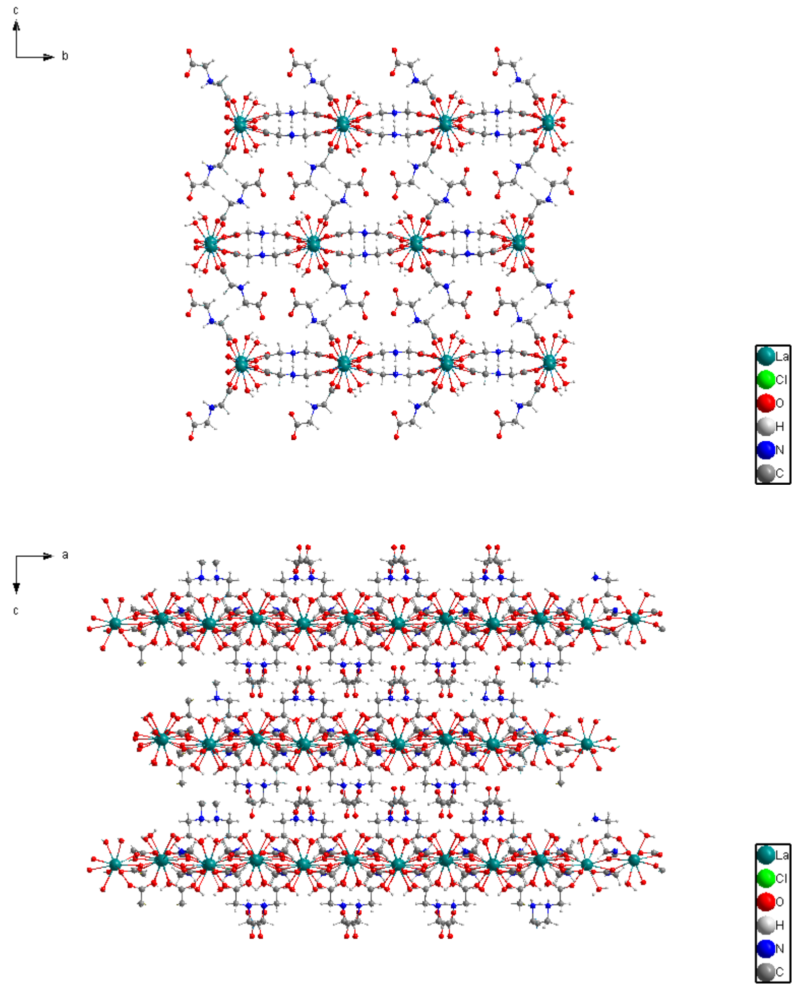


Figure S2. Schematic descriptions of the equivalent topology frameworks in $[La(Hida)_2(H_2O)_2]_n \cdot nCl \cdot 4nH_2O$ (**1**) viewed along *c* axis.

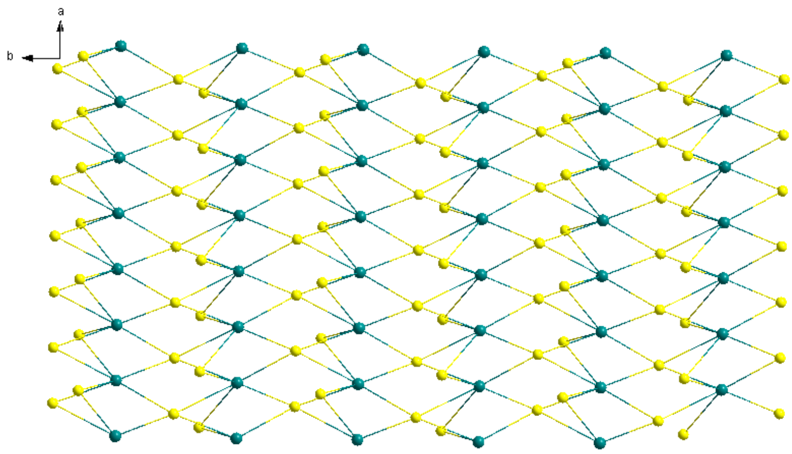
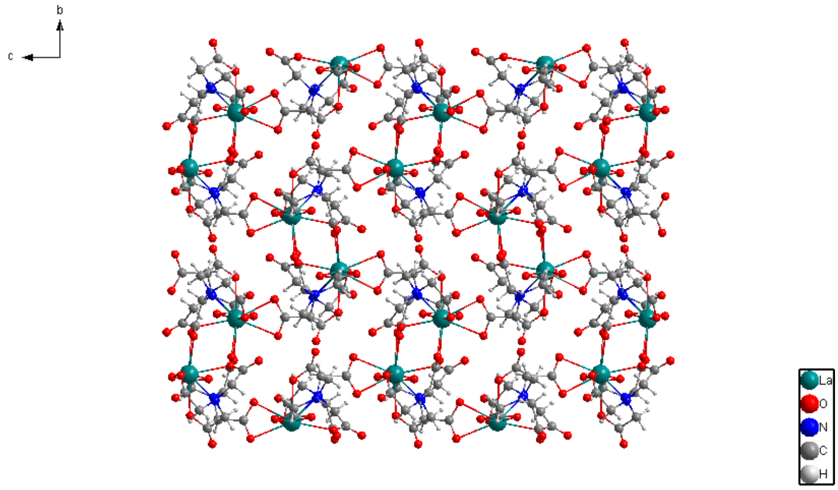


Figure S3. 2D layered structure of $K_{2n}[La(nta)_2]_n \cdot nH_2O$ (**2**) viewed along *a* and *b* axis.



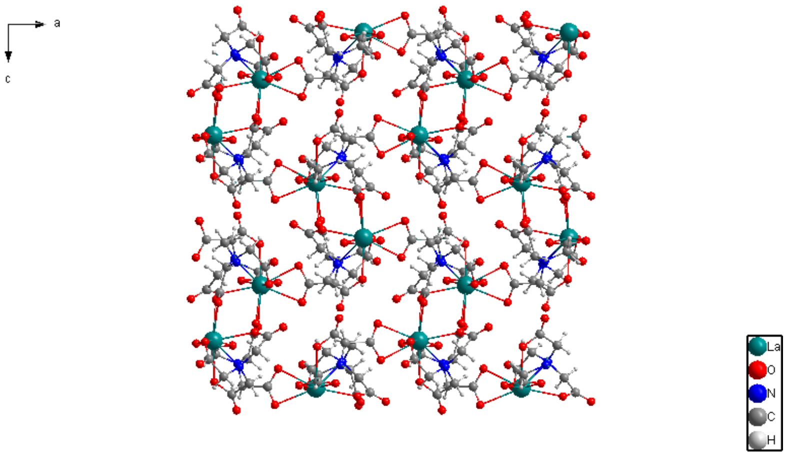


Figure S4. Schematic descriptions of the equivalent topology frameworks in $K_{2n}[La(nta)_2]_n \cdot nH_2O$ (**2**).

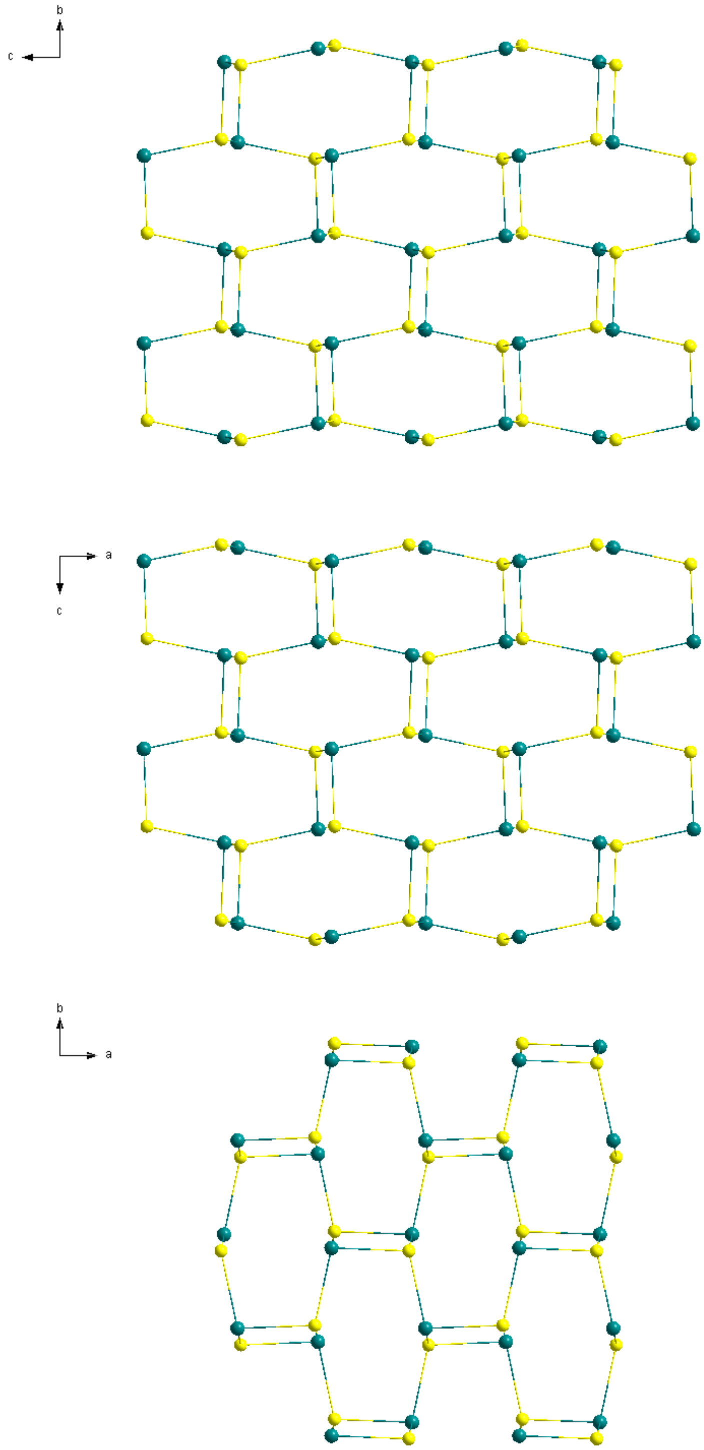


Figure S5. Diagram of the $[La_2(edta)_2(H_2O)_2]^{2-}$ dimeric unit in $(H_2en)_n[La(edta)(H_2O)]_{2n} \cdot 10nH_2O$ (**3**).

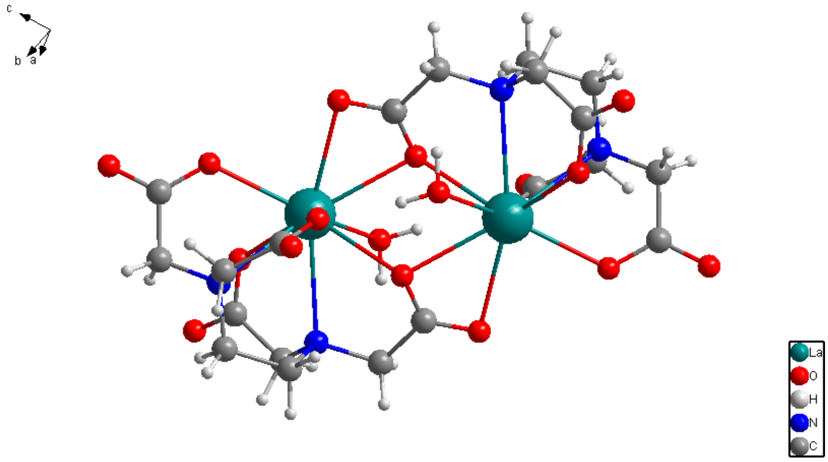


Figure S6. 2D layered structure of $(H_2en)_n[La(edta)(H_2O)]_{2n} \cdot 10nH_2O$ (**3**).

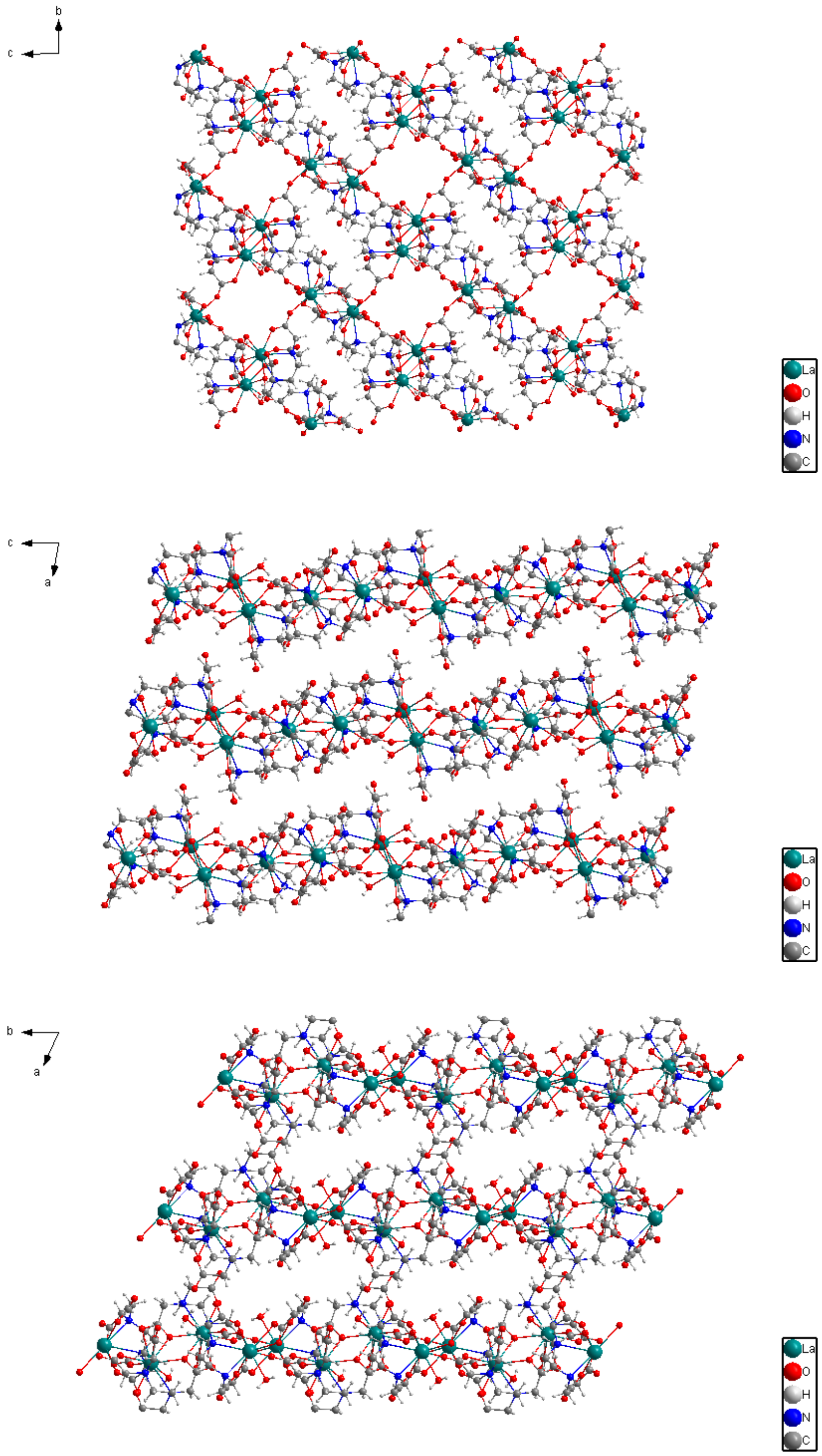


Figure S7. Schematic descriptions of the equivalent topology frameworks in $(H_2en)_n[La(edta)(H_2O)]_{2n}\cdot 10nH_2O$ (**3**) viewed along *c* axis.

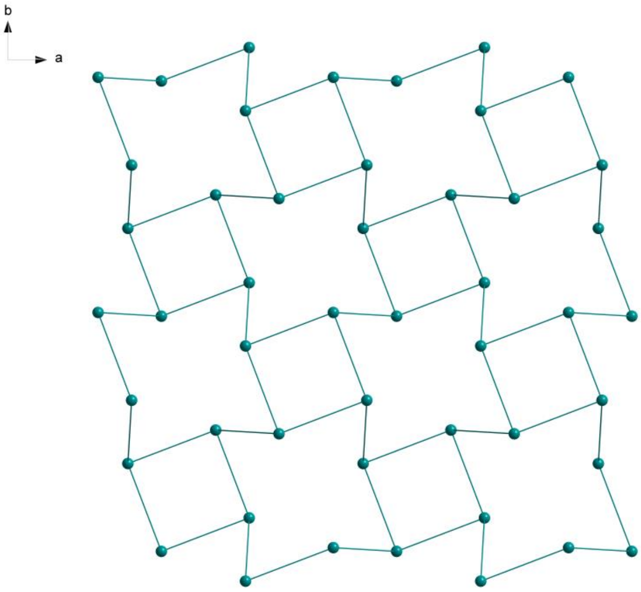


Figure S8. TG–DTG curves of $[La(Hida)_2(H_2O)_2]_n\cdot nCl\cdot 4nH_2O$ (**1**).

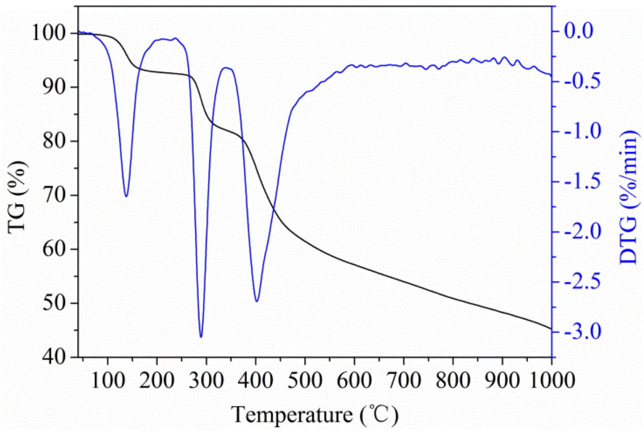


Figure S9. TG–DTG curves of $K_{2n}[La(nta)_2]_n \cdot nH_2O$ (**2**).

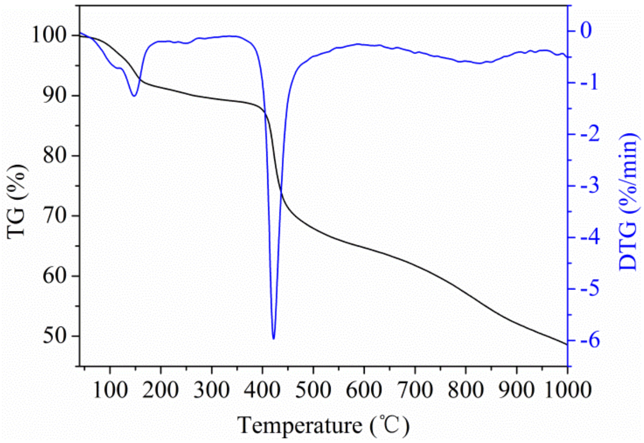


Figure S10. TG–DTG curves of $(H_2en)_n[La(edta)(H_2O)]_{2n} \cdot 10nH_2O$ (**3**).

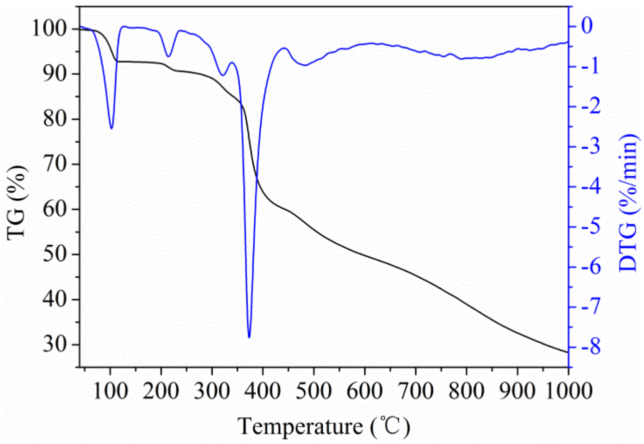


Figure S11. IR spectra of $[La(Hida)_2(H_2O)_2]_n \cdot nCl \cdot 4nH_2O$ (**1**), $K_{2n}[La(nta)_2]_n \cdot nH_2O$ (**2**) and $(H_2en)_n[La(edta)(H_2O)]_{2n} \cdot 10nH_2O$ (**3**).

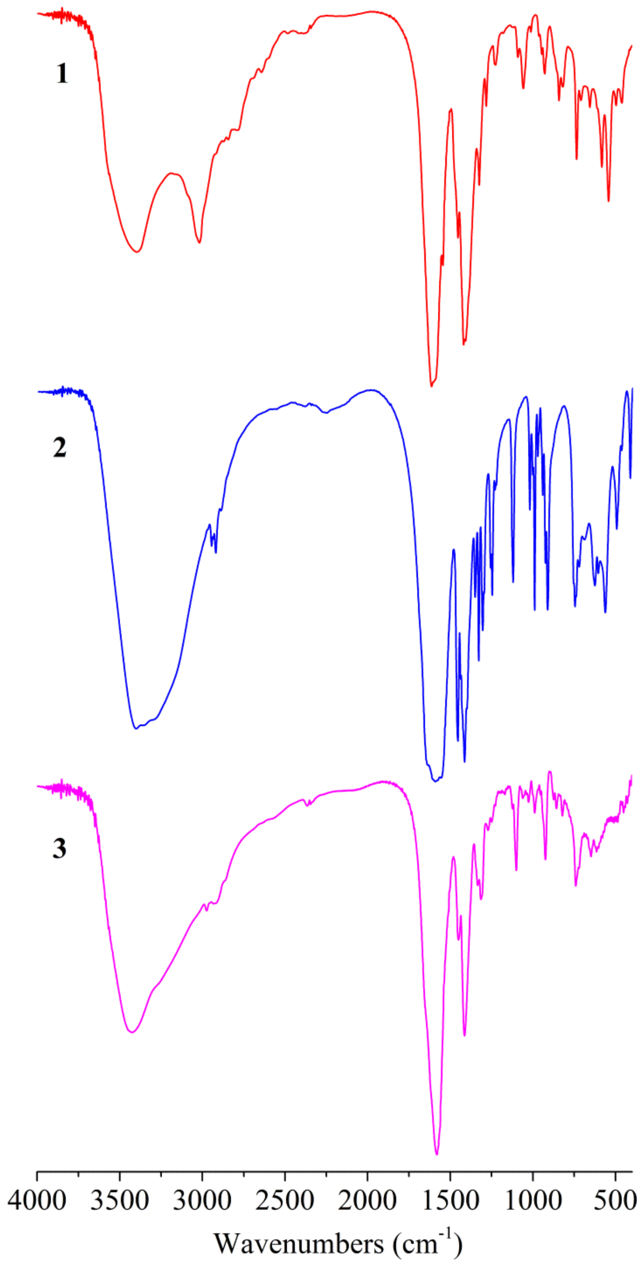


Figure S12. O_2, CO_2, CH_4, N_2 and H_2 adsorption isotherms of $(H_2en)_n[La(edta)(H_2O)]_{2n}\cdot 10nH_2O$ (**3**, a) and $\{La(H_2O)_4[La(1,3\text{-pdta})(H_2O)]_3\}_n\cdot 11.25nH_2O$ (**4**, b) at 298 K.

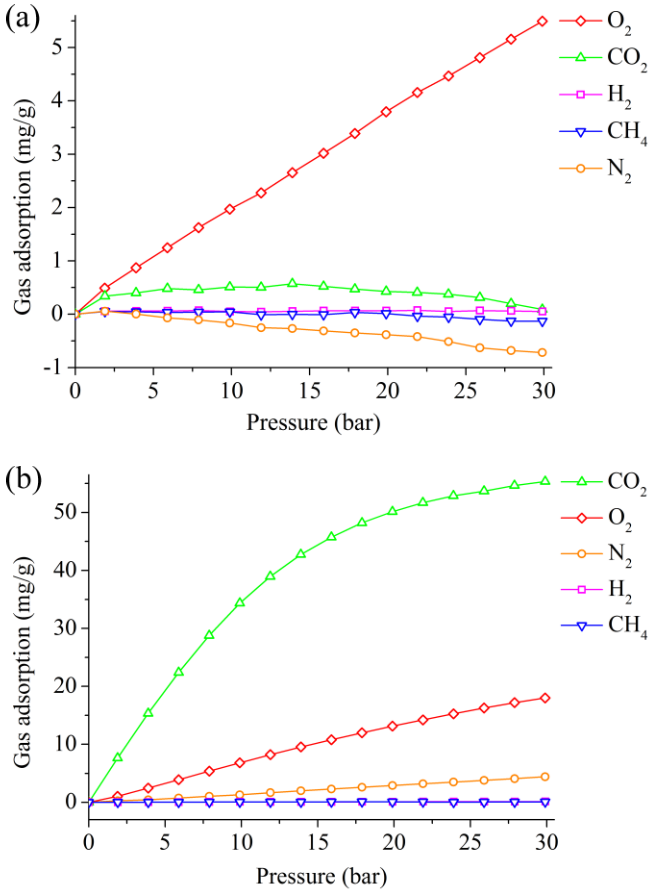


Table S1. Bond valence calculations for $[La(Hida)_2(H_2O)_2]_n \cdot nCl \cdot 4nH_2O$ (**1**), $K_{2n}[La(nta)_2]_n \cdot nH_2O$ (**2**) and $(H_2en)_n[La(edta)(H_2O)]_{2n} \cdot 10nH_2O$ (**3**).

Complexes	Atom	N	$\sum S_{ij}$	Δ
$[La(Hida)_2(H_2O)_2]_n \cdot nCl \cdot 4nH_2O$ (**1**)	La(1)	3+	3.142	0.142
$K_{2n}[La(nta)_2]_n \cdot nH_2O$ (**2**)	La(1)	3+	3.148	0.148
	La(1)	3+	3.281	0.281
$(H_2en)_n[La(edta)(H_2O)]_{2n} \cdot 10nH_2O$ (**3**)	La(2)	3+	3.235	0.235

Table S2. Adsorption data of O_2, CO_2, CH_4, N_2, H_2 and desorption data of O_2 (mg/g) of $(H_2en)_n[La(edta)(H_2O)]_{2n}\cdot10nH_2O$ (**3**) at 298 K under different pressure respectively.

Press (bar)	O_2	CO_2	CH_4	N_2	H_2	Press (bar)	O_2
0.00	0.00	0.00	0.00	0.00	0.00	29.90	5.49
1.89	0.49	0.34	0.05	0.06	0.06	27.90	5.15
3.89	0.87	0.40	0.05	0.00	0.06	25.89	4.80
5.90	1.25	0.48	0.03	-0.07	0.06	23.90	4.45
7.90	1.62	0.46	0.04	-0.11	0.07	21.90	4.14
9.90	1.97	0.51	0.04	-0.16	0.05	19.89	3.77
11.90	2.28	0.51	-0.01	-0.25	0.05	17.90	3.35
13.89	2.65	0.57	0.00	-0.27	0.05	15.89	2.98
15.89	3.02	0.52	-0.01	-0.31	0.06	13.89	2.61
17.90	3.39	0.47	0.03	-0.35	0.07	11.90	2.22
19.90	3.80	0.43	0.01	-0.38	0.06	9.89	1.91
21.90	4.16	0.41	-0.04	-0.42	0.07	7.90	1.56
23.90	4.47	0.38	-0.05	-0.51	0.05	5.90	1.18
25.90	4.81	0.31	-0.10	-0.63	0.07	3.89	0.80
27.90	5.16	0.20	-0.13	-0.68	0.06	1.90	0.41
29.90	5.49	0.09	-0.13	-0.72	0.05	0.00	0.00

Table S3. Adsorption data of O_2, CO_2, CH_4, N_2, H_2 and desorption data of O_2, CO_2 (mg/g) of $\{La(H_2O)_4[La(1,3\text{-pdta})(H_2O)]_3\}_n \cdot 11.25nH_2O$ (**4**) at 298 K under different pressure respectively.

Press (bar)	O_2	CO_2	CH_4	N_2	H_2	Press (bar)	O_2	CO_2
0.00	0.00	0.00	0.00	0.00	0.00	29.89	18.01	55.33
1.89	1.04	7.65	0.02	0.27	0.01	27.89	17.20	53.67
3.89	2.45	15.36	0.02	0.43	0.02	25.89	16.27	52.02
5.90	3.91	22.40	0.03	0.75	0.03	23.89	15.25	50.34
7.90	5.40	28.78	0.05	1.04	0.06	21.89	14.20	48.46
9.90	6.82	34.35	0.04	1.31	0.08	19.89	13.14	46.77
11.90	8.23	38.96	0.05	1.66	0.06	17.89	11.98	45.26
13.89	9.56	42.74	0.04	2.01	0.07	15.89	10.78	43.39
15.89	10.81	45.74	0.07	2.30	0.06	13.89	9.52	41.02
17.90	12.00	48.22	0.09	2.60	0.09	11.89	8.18	38.06
19.90	13.16	50.15	0.09	2.91	0.08	9.89	6.77	34.09
21.90	14.23	51.69	0.06	3.21	0.09	7.89	5.34	28.49
23.90	15.26	52.88	0.03	3.49	0.10	5.89	3.84	22.13
25.90	16.28	53.68	0.05	3.78	0.12	3.89	2.38	15.02
27.90	17.20	54.65	0.06	4.09	0.11	1.89	0.97	6.78
29.90	18.01	55.33	0.08	4.41	0.13	0.00	0.00	0.00

Table S4. Solid state ^{13}C NMR data for $[La(Hida)_2(H_2O)_2]_n \cdot nCl \cdot 4nH_2O$ (**1**), $K_{2n}[La(nta)_2]_n \cdot nH_2O$ (**2**) and $(H_2en)_n[La(edta)(H_2O)]_{2n} \cdot 10nH_2O$ (**3**).

Complexes	$–CH_2N/–CH_2CO_2$	$–CO_2$
$[La(Hida)_2(H_2O)_2]_n \cdot nCl \cdot 4nH_2O$ (**1**)	46.0/49.6	170.7/174.2/175.4/177.3
$K_{2n}[La(nta)_2]_n \cdot nH_2O$ (**2**)	64.4/68.1	178.4/180.5/183.7
$(H_2en)_n[La(edta)(H_2O)]_{2n} \cdot 10nH_2O$ (**3**)	59.2/64.2/66.6/67.9	178.7/180.6/183.9

Table S5. Crystallographic data and structural refinements for $[La(Hida)_2(H_2O)_2]_n \cdot nCl \cdot 4nH_2O$ (**1**), $K_{2n}[La(nta)_2]_n \cdot nH_2O$ (**2**) and $(H_2en)_n[La(edta)(H_2O)]_{2n} \cdot 10nH_2O$ (**3**).

Identification code	**1**	**2**	**3**
Empirical formula	$C_8H_{24}ClLaN_2O_{14}$	$C_{12}H_{14}K_2LaN_2O_{13}$	$C_{22}H_{58}La_2N_6O_{28}$
Formula weight	546.65	611.37	1132.56
Temperature/K	173	293(2)	193
Crystal system	orthorhombic	cubic	triclinic
Space group	*P* bca	$P\,2_13$	$P\,\bar{1}$
a/Å	8.8281(4)	12.3762(2)	13.0217(4)
b/Å	19.2494(8)	12.3762(2)	13.1618(6)
c/Å	22.482(2)	12.3762(2)	14.0976(7)
α/ °	90	90	114.764(5)
β/ °	90	90	92.033(3)
γ/ °	90	90	103.503(4)
Volume/$Å^3$	3820.5(4)	1895.67(9)	2108.9(2)
Crystal size/mm^3	0.3 × 0.2 × 0.04	0.2 × 0.2 × 0.17	0.2 × 0.2 × 0.1
Radiation (Å)	MoKα (λ = 0.71073)	MoKα (λ = 0.71073)	MoKα (λ = 0.71073)
Dx,g cm^{-3}	1.901	2.142	1.784
Z	8	4	2
Mu (mm^{-1})	2.446	2.766	2.097
F(000)	2176.0	1196.0	1140.0
h,k,lmax	12,26,29	17,17,17	17,17,18
Nref	4800	1650	9381
Tmin,Tmax	0.854,1.000	0.991,1.000	0.778,0.811
Data completeness	0.860	1.64/0.92	0.872
Theta(max)	30.019	29.659	28.577
R(reflections)	0.0326(4057)	0.0380(1577)	0.0376(7566)
wR_2(reflections)	0.0815(4800)	0.0802(1650)	0.0853(9381)
S	1.088	1.132	1.049
Npar	249	92	441

Table S6. Selected bond distances (Å) and angles (°) for $[La(Hida)_2(H_2O)_2]_n \cdot nCl \cdot 4nH_2O$ (**1**).

La(1)–O(1)	2.481(2)	La(1)–C(5b)	3.043(3)
La(1)–O(2a)	2.532(2)	La(1)–C(7c)	3.055(3)
La(1)–O(5)	2.505(2)	La(1a)–O(5)	2.745(2)
La(1)–O(5b)	2.745(2)	La(1a)–O(6)	2.611(2)
La(1)–O(6b)	2.611(2)	La(1b)–O(2)	2.532(2)
La(1)–O(7c)	2.746(2)	La(1e)–O(7)	2.524(2)
La(1)–O(7d)	2.524(2)	La(1f)–O(7)	2.746(2)
La(1)–O(8c)	2.644(2)	La(1f)–O(8)	2.644(2)
La(1)–O(1W)	2.722(2)	La(1a)–C(5)	3.043(3)
La(1)–O(2W)	2.614(2)	La(1f)–C(7)	3.055(3)
O(1)–La(1)–O(2a)	136.92(8)	O(6b)–La(1)–O(1W)	70.21(7)
O(1)–La(1)–O(5)	139.34(8)	O(6b)–La(1)–O(2W)	70.79(8)
O(1)–La(1)–O(5b)	67.02(8)	O(6b)–La(1)–C(5b)	23.90(8)
O(1)–La(1)–O(6b)	84.94(8)	O(6b)–La(1)–C(7c)	142.67(8)
O(1)–La(1)–O(7c)	103.98(8)	O(7c)–La(1)–O(7d)	123.21(9)
O(1)–La(1)–O(7d)	73.86(8)	O(7c)–La(1)–O(8c)	48.30(7)
O(1)–La(1)–O(8c)	72.38(8)	O(7c)–La(1)–O(1W)	125.07(7)
O(1)–La(1)–O(1W)	130.92(8)	O(7c)–La(1)–O(2W)	63.31(7)
O(1)–La(1)–O(2W)	67.15(8)	O(7c)–La(1)–C(5b)	146.92(8)
O(1)–La(1)–C(5b)	74.58(9)	O(7c)–La(1)–C(7c)	24.64(7)
O(1)–La(1)–C(7c)	88.48(9)	O(7d)–La(1)–O(8c)	79.64(8)
O(2a)–La(1)–O(5)	78.29(8)	O(7d)–La(1)–O(1W)	77.60(7)
O(2a)–La(1)–O(5b)	122.76(7)	O(7d)–La(1)–O(2W)	140.51(8)
O(2a)–La(1)–O(6b)	134.99(8)	O(7d)–La(1)–C(5b)	88.70(8)
O(2a)–La(1)–O(7c)	69.83(7)	O(7d)–La(1)–C(7c)	100.80(8)
O(2a)–La(1)–O(7d)	75.24(7)	O(8c)–La(1)–O(1W)	139.18(8)
O(2a)–La(1)–O(8c)	73.13(8)	O(8c)–La(1)–O(2W)	82.94(8)
O(2a)–La(1)–O(1W)	68.54(8)	O(8c)–La(1)–C(5b)	146.85(8)
O(2a)–La(1)–O(2W)	132.09(7)	O(8c)–La(1)–C(7c)	23.70(8)
O(2a)–La(1)–C(5b)	133.66(8)	O(1W)–La(1)–O(2W)	134.20(7)
O(2a)–La(1)–C(7c)	68.73(9)	O(1W)–La(1)–C(5b)	65.61(8)
O(5)–La(1)–O(5b)	116.11(9)	O(1W)–La(1)–C(7c)	136.09(8)
O(5)–La(1)–O(6b)	73.39(8)	O(2W)–La(1)–C(5b)	86.91(8)
O(5)–La(1)–O(7c)	64.39(7)	O(2W)–La(1)–C(7c)	72.79(8)
O(5)–La(1)–O(7d)	146.19(8)	C(5b)–La(1)–C(7c)	157.57(9)
O(5)–La(1)–O(8c)	112.22(8)	La(1)–O(5)–La(1a)	115.21(9)
O(5)–La(1)–O(1W)	73.35(8)	La(1e)–O(7)–La(1f)	114.57(8)
O(5)–La(1)–O(2W)	73.30(8)	O(5)–C(5)–La(1a)	64.4(2)
O(5)–La(1)–C(5b)	94.69(8)	O(6)–C(5)–La(1a)	58.2(2)
O(5)–La(1)–C(7c)	88.64(8)	O(7)–C(7)–La(1f)	63.9(2)
O(5b)–La(1)–O(6b)	48.54(7)	O(8)–C(7)–La(1f)	59.2(2)

O(5b)–La(1)–O(7c)	167.40(7)	C(1)–O(1)–La(1)	142.9(2)
O(5b)–La(1)–O(7d)	64.17(7)	C(1)–O(2)–La(1b)	135.3(2)
O(5b)–La(1)–O(8c)	131.19(8)	C(5)–O(5)–La(1)	153.4(2)
O(5b)–La(1)–O(1W)	64.78(7)	C(5)–O(5)–La(1a)	90.9(2)
O(5b)–La(1)–O(2W)	104.33(7)	C(5)–O(6)–La(1a)	97.9(2)
O(5b)–La(1)–C(5b)	24.65(8)	C(7)–O(7)–La(1e)	146.6(2)
O(5b)–La(1)–C(7c)	153.63(8)	C(7)–O(7)–La(1f)	91.4(2)
O(6b)–La(1)–O(7c)	124.07(7)	C(7)–O(8)–La(1f)	97.1(2)
O(6b)–La(1)–O(7d)	112.41(7)	C(6)–C(5)–La(1a)	177.1(2)
O(6b)–La(1)–O(8c)	150.52(8)	C(8)–C(7)–La(1f)	176.5(2)

Symmetry codes: (a) -½ + *x*, *y*, ½ – *z*; (b) ½ + *x*, *y*, ½ – *z*; (c) -*x*, -½ + *y*, ½ – *z*; (d) ½ – *x*, -½ + *y*, *z*; (e) ½ – *x*, ½ + *y*, *z*; (f) -*x*, ½ + *y*, ½ – *z*;

Table S7. Selected bond distances (Å) and angles (°) for $K_{2n}[La(nta)_2]_n \cdot nH_2O$ (**2**).

La(1)–O(1)	2.542(5)	La(1)–O(4b)	2.631(5)
La(1)–O(1a)	2.542(5)	La(1)–N(1)	2.68(1)
La(1)–O(1b)	2.542(5)	La(1)–C(4)	2.990(6)
La(1)–O(3)	2.674(5)	La(1)–C(4a)	2.990(6)
La(1)–O(3a)	2.674(5)	La(1c)–K(1)	3.959(3)
La(1)–O(3b)	2.674(5)	La(1d)–K(2)	4.5610(9)
La(1)–O(4)	2.631(5)	La(1e)–K(2)	4.5610(9)
La(1)–O(4a)	2.631(5)		
O(1)–La(1)–O(1a)	100.4(2)	O(4a)–La(1)–O(4b)	116.04(7)
O(1)–La(1)–O(1b)	100.4(2)	O(4a)–La(1)–N(1)	101.6(1)
O(1)–La(1)–O(3)	75.2(2)	O(4a)–La(1)–C(4)	93.7(2)
O(1)–La(1)–O(3a)	116.5(2)	O(4a)–La(1)–C(4a)	24.6(2)
O(1)–La(1)–O(3b)	143.1(2)	O(4b)–La(1)–N(1)	101.6(1)
O(1)–La(1)–O(4)	71.4(2)	O(4b)–La(1)–C(4)	123.8(2)
O(1)–La(1)–O(4a)	68.7(2)	O(4b)–La(1)–C(4a)	93.7(2)
O(1)–La(1)–O(4b)	164.1(2)	N(1)–La(1)–C(4)	118.4(2)
O(1)–La(1)–N(1)	62.5(1)	N(1)–La(1)–C(4a)	118.4(1)
O(1)–La(1)–C(4)	69.2(2)	C(4)–La(1)–C(4a)	99.2(2)
O(1)–La(1)–C(4a)	92.9(2)	O(2)–K(1)–La(1c)	114.5(2)
O(1a)–La(1)–O(1b)	100.4(2)	O(2h)–K(1)–La(1c)	114.5(2)
O(1a)–La(1)–O(3)	143.1(2)	O(2i)–K(1)–La(1c)	114.5(2)
O(1a)–La(1)–O(3a)	75.2(2)	O(3c)–K(1)–La(1c)	42.4(1)
O(1a)–La(1)–O(3b)	116.5(2)	O(3f)–K(1)–La(1c)	42.4(1)
O(1a)–La(1)–O(4)	164.1(2)	O(3g)–K(1)–La(1c)	42.4(1)
O(1a)–La(1)–O(4a)	71.4(2)	C(2)–K(1)–La(1c)	104.7(1)
O(1a)–La(1)–O(4b)	68.7(2)	C(2h)–K(1)–La(1c)	104.7(1)
O(1a)–La(1)–N(1)	62.5(1)	C(2i)–K(1)–La(1c)	104.7(1)
O(1a)–La(1)–C(4)	164.5(2)	La(1)–K(2)–La(1d)	112.52(3)
O(1a)–La(1)–C(4a)	69.2(2)	La(1)–K(2)–La(1e)	112.52(3)
O(1b)–La(1)–O(3)	116.5(2)	La(1d)–K(2)–La(1e)	112.52(3)
O(1b)–La(1)–O(3a)	143.1(2)	O(1)–K(2)–La(1)	30.3(1)
O(1b)–La(1)–O(3b)	75.2(2)	O(1)–K(2)–La(1d)	135.0(1)
O(1b)–La(1)–O(4)	68.7(2)	O(1)–K(2)–La(1e)	108.2(1)
O(1b)–La(1)–O(4a)	164.1(2)	O(1k)–K(2)–La(1)	135.0(1)
O(1b)–La(1)–O(4b)	71.4(2)	O(1k)–K(2)–La(1d)	108.2(1)
O(1b)–La(1)–N(1)	62.5(1)	O(1k)–K(2)–La(1e)	30.3(1)
O(1b)–La(1)–C(4)	92.9(2)	O(1l)–K(2)–La(1)	108.2(1)
O(1b)–La(1)–C(4a)	164.5(2)	O(1l)–K(2)–La(1d)	30.3(1)
O(3)–La(1)–O(3a)	74.6(2)	O(1l)–K(2)–La(1e)	135.0(1)
O(3)–La(1)–O(3b)	74.6(2)	O(4a)–K(2)–La(1)	32.4(1)
O(3)–La(1)–O(4)	49.5(1)	O(4a)–K(2)–La(1d)	93.8(1)
O(3)–La(1)–O(4a)	73.0(2)	O(4a)–K(2)–La(1e)	98.8(1)

O(3)–La(1)–O(4b)	120.6(2)	O(4d)–K(2)–La(1)	98.8(1)
O(3)–La(1)–N(1)	135.6(1)	O(4d)–K(2)–La(1d)	32.4(1)
O(3)–La(1)–C(4)	25.1(2)	O(4d)–K(2)–La(1e)	93.8(1)
O(3)–La(1)–C(4a)	74.5(2)	O(4j)–K(2)–La(1)	93.8(1)
O(3a)–La(1)–O(3b)	74.6(2)	O(4j)–K(2)–La(1d)	98.8(1)
O(3a)–La(1)–O(4)	120.6(2)	O(4j)–K(2)–La(1e)	32.4(1)
O(3a)–La(1)–O(4a)	49.5(1)	O(1W)–K(2)–La(1)	106.22(4)
O(3a)–La(1)–O(4b)	73.0(2)	O(1W)–K(2)–La(1d)	106.22(4)
O(3a)–La(1)–N(1)	135.6(1)	O(1W)–K(2)–La(1e)	106.22(4)
O(3a)–La(1)–C(4)	98.8(2)	La(1)–O(1)–K(2)	115.3(2)
O(3a)–La(1)–C(4a)	25.1(2)	La(1)–O(4)–K(2c)	111.8(2)
O(3b)–La(1)–O(4)	73.0(2)	La(1)–O(3)–K(1d)	93.2(2)
O(3b)–La(1)–O(4a)	120.6(2)	O(3)–C(4)–La(1)	63.4(3)
O(3b)–La(1)–O(4b)	49.5(1)	O(4)–C(4)–La(1)	61.4(3)
O(3b)–La(1)–N(1)	135.6(1)	C(1)–N(1)–La(1)	108.3(5)
O(3b)–La(1)–C(4)	74.5(2)	C(1a)–N(1)–La(1)	108.3(5)
O(3b)–La(1)–C(4a)	98.8(2)	C(1b)–N(1)–La(1)	108.3(5)
O(4)–La(1)–O(4a)	116.04(7)	C(2)–O(1)–La(1)	120.7(4)
O(4)–La(1)–O(4b)	116.04(7)	C(3)–C(4)–La(1)	170.6(5)
O(4)–La(1)–N(1)	101.6(1)	C(4)–O(3)–La(1)	91.5(4)
O(4)–La(1)–C(4)	24.6(2)	C(4)–O(4)–La(1)	94.0(4)
O(4)–La(1)–C(4a)	123.8(2)		

Symmetry codes: (a) *y*, *z*, *x*; (b) *z*, *x*, *y*; (c) 1 – *x*, ½ + *y*, ½ – *z*; (d) 1 – *x*, -½ + *y*, ½ – *z*; (e) ½ + *x*, ½ – *y*, 1 – *z*; (f) 1 – *z*, ½ + *x*, ½ – *y*; (g) 1 – *y*, ½ + z, ½ – *x*; (h) 1½ – *y*, 1 – *z*, -½ + *x*; (i) ½ + z, 1½ – *x*, 1 – *y*; (j) ½ + *z*, ½ – *x*, 1 – *y*; (k) ½ + *y*, ½ – *z*, 1 – *x*; (l) 1 – *z*, -½ + *x*, ½ – *y*;

Table S8. Selected bond distances (Å) and angles (°) for $(H_2en)_n[La(edta)(H_2O)]_{2n}\cdot10nH_2O$ (**3**).

La(1)–O(1)	2.564(4)	La(2)–O(11)	2.476(8)
La(1)–O(3)	2.500(5)	La(2)–O(13)	2.534(7)
La(1)–O(5)	2.454(5)	La(2)–O(15)	2.519(5)
La(1)–O(7)	2.583(4)	La(2)–O(2W)	2.547(5)
La(1)–O(7a)	2.656(4)	La(2)–N(3)	2.854(6)
La(1)–O(8a)	2.724(5)	La(2)–N(4)	2.835(6)
La(1)–O(16b)	2.536(5)	La(2)–C(11c)	3.093(9)
La(1)–O(1W)	2.552(4)	La(1a)–O(7)	2.656(4)
La(1)–N(1)	2.859(5)	La(1a)–O(8)	2.723(5)
La(1)–N(2)	2.848(5)	La(1a)–C(9)	3.049(7)
La(1)–C(9a)	3.049(7)	La(1b)–O(16)	2.536(5)
La(2)–O(2)	2.537(5)	La(2c)–O(9)	2.691(6)
La(2)–O(9)	2.572(6)	La(2c)–O(10)	2.773(7)
La(2)–O(9c)	2.691(6)	La(2c)–C(11)	3.093(9)
La(2)–O(10c)	2.773(7)		
O(1)–La(1)–O(3)	79.3(2)	O(9)–La(2)–N(4)	88.4(2)
O(1)–La(1)–O(5)	78.8(1)	O(9)–La(2)–C(11c)	79.6(2)
O(1)–La(1)–O(7)	144.4(1)	O(9c)–La(2)–O(10c)	47.2(2)
O(1)–La(1)–O(7a)	121.6(1)	O(9c)–La(2)–O(11)	150.6(2)
O(1)–La(1)–O(8a)	73.6(2)	O(9c)–La(2)–O(13)	76.3(2)
O(1)–La(1)–O(16b)	70.7(2)	O(9c)–La(2)–O(15)	120.3(2)
O(1)–La(1)–O(1W)	144.5(1)	O(9c)–La(2)–O(2W)	71.8(2)
O(1)–La(1)–N(1)	59.7(2)	O(9c)–La(2)–N(3)	115.5(2)
O(1)–La(1)–N(2)	120.3(2)	O(9c)–La(2)–N(4)	136.5(2)
O(1)–La(1)–C(9a)	97.4(2)	O(9c)–La(2)–C(11c)	24.3(2)
O(3)–La(1)–O(5)	133.2(2)	O(11)–La(2)–O(10c)	136.0(2)
O(3)–La(1)–O(7)	65.9(1)	O(10c)–La(2)–O(13)	67.1(2)
O(3)–La(1)–O(7a)	82.4(1)	O(10c)–La(2)–O(15)	74.0(2)
O(3)–La(1)–O(8a)	72.4(2)	O(10c)–La(2)–O(2W)	106.4(2)
O(3)–La(1)–O(16b)	135.2(2)	O(10c)–La(2)–N(3)	161.3(2)
O(3)–La(1)–O(1W)	136.0(2)	O(10c)–La(2)–N(4)	121.5(2)
O(3)–La(1)–N(1)	63.1(2)	O(10c)–La(2)–C(11c)	23.7(2)
O(3)–La(1)–N(2)	95.4(2)	O(11)–La(2)–O(13)	133.1(2)
O(3)–La(1)–C(9a)	72.9(2)	O(11)–La(2)–O(15)	77.8(2)
O(5)–La(1)–O(7)	120.2(1)	O(11)–La(2)–O(2W)	81.3(2)
O(5)–La(1)–O(7a)	143.8(1)	O(11)–La(2)–N(3)	62.1(2)
O(5)–La(1)–O(8a)	137.2(1)	O(11)–La(2)–N(4)	71.1(2)
O(5)–La(1)–O(16b)	72.6(2)	O(11)–La(2)–C(11c)	154.1(2)
O(5)–La(1)–O(1W)	77.1(1)	O(13)–La(2)–O(15)	72.1(2)
O(5)–La(1)–N(1)	70.1(1)	O(13)–La(2)–O(2W)	138.7(2)
O(5)–La(1)–N(2)	62.3(1)	O(13)–La(2)–N(3)	104.8(2)

O(5)–La(1)–C(9a)	150.8(2)	O(13)–La(2)–N(4)	63.4(2)
O(7)–La(1)–O(7a)	62.2(2)	O(13)–La(2)–C(11c)	65.6(2)
O(7)–La(1)–O(8a)	100.9(1)	O(15)–La(2)–O(2W)	147.9(2)
O(7)–La(1)–O(16b)	141.0(1)	O(15)–La(2)–N(3)	120.8(2)
O(7)–La(1)–O(1W)	71.0(1)	O(15)–La(2)–N(4)	63.0(2)
O(7)–La(1)–N(1)	96.5(1)	O(15)–La(2)–C(11c)	96.1(2)
O(7)–La(1)–N(2)	59.5(1)	O(2W)–La(2)–N(3)	67.8(2)
O(7)–La(1)–C(9a)	79.5(1)	O(2W)–La(2)–N(4)	131.2(2)
O(7a)–La(1)–O(8a)	48.0(1)	O(2W)–La(2)–C(11c)	92.2(2)
O(7a)–La(1)–O(16b)	85.9(2)	N(3)–La(2)–N(4)	63.9(2)
O(7a)–La(1)–O(1W)	70.0(1)	N(3)–La(2)–C(11c)	138.0(2)
O(7a)–La(1)–N(1)	145.1(1)	N(4)–La(2)–C(11c)	128.6(2)
O(7a)–La(1)–N(2)	116.3(1)	La(1)–O(7)–La(1a)	117.8(2)
O(7a)–La(1)–C(9a)	24.4(1)	C(1)–O(1)–La(1)	123.1(4)
O(8a)–La(1)–O(16b)	67.8(2)	C(3)–O(3)–La(1)	129.4(5)
O(8a)–La(1)–O(1W)	108.7(2)	C(7)–O(5)–La(1)	131.0(4)
O(8a)–La(1)–N(1)	119.2(1)	C(9)–O(7)–La(1)	122.6(4)
O(8a)–La(1)–N(2)	160.3(1)	C(2)–N(1)–La(1)	106.1(3)
O(8a)–La(1)–C(9a)	24.1(1)	C(4)–N(1)–La(1)	109.2(4)
O(16b)–La(1)–O(1W)	77.5(2)	C(5)–N(1)–La(1)	110.6(3)
O(16b)–La(1)–N(1)	122.0(2)	C(6)–N(2)–La(1)	104.9(3)
O(16b)–La(1)–N(2)	128.2(2)	C(8)–N(2)–La(1)	110.4(3)
O(16b)–La(1)–C(9a)	78.8(2)	C(10)–N(2)–La(1)	110.7(4)
O(1W)–La(1)–N(1)	132.1(2)	C(9)–O(7)–La(1a)	95.5(4)
O(1W)–La(1)–N(2)	69.1(1)	C(9)–O(8)–La(1a)	92.7(4)
O(1W)–La(1)–C(9a)	91.4(2)	C(19)–O(16)–La(1b)	151.3(5)
N(1)–La(1)–N(2)	65.1(1)	La(2)–O(9)–La(2c)	118.4(2)
N(1)–La(1)–C(9a)	138.2(1)	C(1)–O(2)–La(2)	146.0(5)
N(2)–La(1)–C(9a)	132.9(2)	C(11)–O(9)–La(2)	124.5(6)
O(2)–La(2)–O(9)	139.1(2)	C(13)–O(11)–La(2)	130.3(7)
O(2)–La(2)–O(9c)	87.7(2)	C(17)–O(13)–La(2)	126.8(6)
O(2)–La(2)–O(10c)	68.7(2)	C(19)–O(15)–La(2)	128.4(5)
O(2)–La(2)–O(11)	72.9(2)	C(12)–N(3)–La(2)	109.5(5)
O(2)–La(2)–O(13)	131.8(2)	C(14)–N(3)–La(2)	108.4(5)
O(2)–La(2)–O(15)	78.1(2)	C(15)–N(3)–La(2)	109.8(6)
O(2)–La(2)–O(2W)	72.6(2)	C(16)–N(4)–La(2)	112.8(4)
O(2)–La(2)–N(3)	123.0(2)	C(18)–N(4)–La(2)	108.0(5)
O(2)–La(2)–N(4)	131.2(2)	C(20)–N(4)–La(2)	107.3(4)
O(2)–La(2)–C(11c)	81.2(2)	O(7)–C(9)–La(1a)	60.1(3)
O(9)–La(2)–O(9c)	61.6(2)	O(8)–C(9)–La(1a)	63.1(4)
O(9)–La(2)–O(10c)	102.0(2)	C(10)–C(9)–La(1a)	165.7(4)
O(9)–La(2)–O(11)	121.2(2)	C(11)–O(9)–La(2c)	95.8(5)
O(9)–La(2)–O(13)	69.6(2)	C(11)–O(10)–La(2c)	92.7(5)
O(9)–La(2)–O(15)	139.6(2)	O(9)–C(11)–La(2c)	60.0(5)

O(9)–La(2)–O(2W)	72.4(2)	O(10)–C(11)–La(2c)	63.6(5)
O(9)–La(2)–N(3)	59.5(2)	C(12)–C(11)–La(2c)	159.6(5)

Symmetry codes: (a) $1 - x$, $2 - y$, $2 - z$; (b) $1 - x$, $2 - y$, $1 - z$; (c) $1 - x$, $1 - y$, $1 - z$;

Table S9. Selected bond distances (Å) and angles (°) within the water layer in $[La(Hida)_2(H_2O)_2]_n \cdot nCl \cdot 4nH_2O$ (**1**).

D–H···A	D–H(Å)	H···A(Å)	D···A(Å)	D–H···A(°)
O_{1w}–H···O_{6wa}	0.89	1.95	2.810(4)	163
O_{1w}–H···Cl_{1b}	0.89	2.35	3.196(3)	159
O_{2w}–H···O_{4c}	0.88	1.89	2.758(4)	168
O_{2w}–H···O_{1wd}	0.88	2.03	2.865(4)	157
O_{3w}–H···O_{2we}	0.85	2.24	3.071(4)	165
O_{3w}–H···O_{4w}	0.85	1.90	2.753(4)	177
O_{4w}–H···O_{5w}	0.85	1.95	2.767(4)	162
O_{4w}–H···O_{6wf}	0.85	2.01	2.845(4)	169
O_{5w}–H···O_{4f}	0.85	1.96	2.801(4)	174
O_{5w}–H···Cl_{1g}	0.85	2.30	3.148(3)	177
O_{6w}–H···O_3	0.85	1.95	2.777(4)	164
O_{6w}–H···O_{4f}	0.85	1.97	2.809(4)	169
N_1–H···O_{3w}	0.91	1.89	2.769(4)	160
N_1–H···Cl_{1h}	0.91	2.33	3.203(3)	162
N_2–H···O_{5wa}	0.91	1.91	2.814(4)	174
N_2–H···Cl_1	0.91	2.33	3.097(3)	142

Symmetry codes: (a) 1 – *x*, ½ + *y*, ½ – *z*; (b) ½ + *x*, *y*, ½ – *z*; (c) -½ + *x*, ½ – *y*, 1 – *z*; (d) -½ + *x*, *y*, ½ – *z*; (e) 1 + *x*, *y*, *z*; (f) 2 – *x*, -*y*, 1 – *z*; (g) 1½ – *x*, -½ + *y*, *z*; (h) ½ – *x*, -½ + *y*, *z*;

Table S10. Selected bond distances (Å) and angles (°) within the water layer in $(H_2en)_n[La(edta)(H_2O)]_{2n}\cdot 10nH_2O$ (**3**).

D–H···A	D–H(Å)	H···A(Å)	D···A(Å)	D–H···A(°)
N_5–H ··O_2	0.90	1.94	2.838(8)	179
N_6–H ··O_{10}	0.90	2.05	2.942(8)	174
N_6–H ··O_{11}	0.90	2.47	3.036(8)	121
N_6–H ··O_{8a}	0.90	1.94	2.807(8)	161
O_7–H ··O_{5b}	0.85	1.90	2.729(6)	162
O_{18}–H ··O_{12c}	0.86	2.32	2.721(6)	109

Symmetry codes: (a) -*x*, -1 – *y*, 1 – *z*; (b) -*x*, -1 – *y*, -*z*; (c) -1 – *x*, -1 – *y*, 1 – *z*;

Table S11. Comparisons of selected bond distances (Å) for **1 – 33**.

Complexes	La–$O_{carboxy}$(av)	La–N(av)	La–O_w(av)
$[La(Hida)_2(H_2O)_2]_n \cdot nCl \cdot 4nH_2O$ (**1**)	2.599(2)	–	2.668(2)
$K_{2n}[La(nta)_2]_n \cdot nH_2O$ (**2**)	2.616(5)	2.68(1)	–
$(H_2en)_n[La(edta)(H_2O)]_{2n} \cdot 10nH_2O$ (**3**)	2.580(8)	2.849(6)	2.550(5)
$\{La(H_2O)_4[La(1,3\text{-}pdta)(H_2O)]_3\}_n \cdot 11.25nH_2O$ (**4**)[1]	2.621(7)	2.876(7)	2.521(9)
$[LaZn(Hida)(ida)_2 \cdot 0.5H_2O]_n$ (**5**)[2]	2.615(3)	–	–
$\{[La_2Cu(mida)_4(H_2O)_6](H_2O)_4\}$ (**6**)[3]	2.622(3)	2.876(3)	2.587(2)
$\{[La_2Ni(mida)_4(H_2O)_6](H_2O)_4\}$ (**7**)[4]	2.636(2)	2.864(2)	2.560(2)
$[La(bzlida)(Hbzlida)] \cdot H_2O$ (**8**)[5]	2.540(2)	2.880(2)	2.634(2)
$[La(nta)(H_2O)]_n$ (**9**)[6]	2.561(4)	2.825(5)	2.569(4)
$[La(nta)(H_2O)]_n$ (**9a**)[7]	2.560(4)	2.827(5)	2.558(4)
$Na[La(edta)(H_2O)_3] \cdot 5H_2O$ (**10**)[8]	2.493(4)	2.768(4)	2.589(4)
$\{[La(edta)(H_2O)]_2\}_n$ (**11**)[9]	2.524(3)	2.849(4)	2.655(4)
$[La_5Cl_2(edta)_3(H_2O)_{18}]_nCl_n \cdot 8nH_2O$ (**12**)[10]	2.57(1)	2.82(1)	–
$Na_{12n}[La(edta)(HPO_3)]_{4n} \cdot 8nNaCl \cdot 4nH_2O$ (**13**)[11]	2.570(7)	2.822(8)	–
$Na_{12n}[La(edta)(CO_3)]_{4n} \cdot 8nNaCl \cdot 4nH_2O$ (**14**)[11]	2.572(6)	2.829(7)	–
$K_{3n}[La(edta)(HPO_3)]_n \cdot 7nH_2O$ (**15**)[12]	2.545(7)	2.793(9)	–
$[La_2(NO_3)_2(edta)(H_2O)_5]_n \cdot 3nH_2O$ (**16**)[10]	2.515(3)	2.746(3)	–
$[La_2(SO_4)(edta)(H_2O)_3]_n$ (**17**)[10]	2.612(3)	2.786(4)	2.532(3)
$K_6[La_2(Hmal)_2(edta)_2] \cdot 14H_2O$ (**18**)[13]	2.563(2)	2.801(2)	–
$(NH_4)_8[La_2(Hcit)_2(edta)_2] \cdot 9H_2O$ (**19**)[13]	2.563(2)	2.814(2)	–
$K_8[La_2(Hcit)_2(edta)_2] \cdot 16H_2O$ (**20**)[13]	2.563(7)	2.785(9)	–
$K_4(NH_4)_4[La_2(Hcit)_2(edta)_2] \cdot 17H_2O$ (**21**)[14]	2.568(5)	2.809(6)	–
$K_2(NH_4)_8\{[La(edta)(H_2O)_2]_2[La_2(Hcit)_2(edta)_2]\} \cdot 22H_2O$ (**22**)[14]	2.549(3)	2.805(3)	2.650(3)

$(NH_4)_2[La_2(1,3\text{-pdta})_2(H_2O)_4]\cdot 8H_2O$ (**23**)[15]	2.531(2)	2.840(2)	2.574(2)
$K_2[La_2(1,3\text{-pdta})_2(H_2O)_4]\cdot 11H_2O$ (**24**)[15]	2.531(2)	2.832(2)	2.584(2)
$[La(1,3\text{-Hpdta})]_n\cdot nH_2O$ (**25**)[16]	2.571(4)	2.858(3)	–
$[La(1,3\text{-}H_2pdta)(H_2O)_2]_n\cdot Cl_n\cdot 2nH_2O$ (**26**)[16]	2.505(2)	–	2.553(2)
$[La(1,3\text{-}H_3pdta)(H_2O)_5]_n\cdot 2Cl_n\cdot 3nH_2O$ (**27**)[16]	2.562(2)	–	2.566(5)
$\{La(H_2O)_4[La(1,3\text{-pdta})(H_2O)]_3\}_n$ (**28**)[17]	2.495(3)	2.881(4)	2.536(3)
$(H_2en)_n[La_2(1,3\text{-pdta})_2(H_2O)_2]_n\cdot 5nH_2O$ (**29**)[18]	2.597(5)	2.867(5)	2.530(5)
$(NH_4)_{2n}[La_2(1,3\text{-pdta})_2(H_2O)_2]_n\cdot 4.5nH_2O$ (**30**)[18]	2.590(6)	2.871(7)	2.541(5)
$[La_2(1,3\text{-pdta})_2(H_2O)_4]_n\cdot\{Sr_2(H_2O)_6]_n\cdot$ $[La_2(1,3\text{-pdta})_2(H_2O)_2]_n\cdot 18nH_2O$ (**31**)[15]	2.542(3)/ 2.555(3)	2.864(4)/ 2.861(4)	2.504(3)/ 2.557(3)
$K_4[La_2(dtpa)_2(H_2O)]\cdot 8H_2O$ (**32**)[19]	2.548(6)	2.848(6)	2.675(5)
$K[KLa(Httha)(H_2O)]\cdot 8H_2O$ (**33**)[20]	2.557(2)	2.807(3)	–

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