Electronic Supporting Information

Zinc(II), iron(II/III) and ruthenium(II) complexes of *o*-phenylenediamine derivatives: oxidative dehydrogenation and photoluminescence

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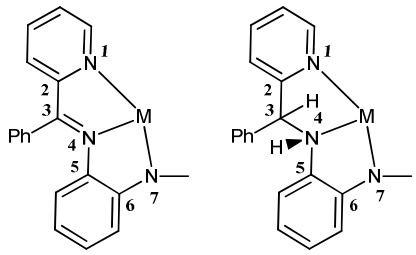
Chart S1



(**D**) (**E**)

Table S1 ν_{N-H} and $\nu_{C=N}$ Stretching Frequencies of L_2H, L_3H_2, L_6H and **1**-**4**, $\mathbf{5}^{+}PF_6^{-}$ and **6**

Substrate	ν_{N-H} (cm^{-1})	$\nu_{C=N}$ (cm^{-1})
L_2H	3378, 3232, 3327	1591, 1507
L_3H_2	3422, 3254	1593, 1509
L_5H_3	3394, 3305, 3246	1585, 1508
L_6H	3300, 3294	1594, 1503
1	… …	1595, 1488
2	… …	1595, 1488
3	3448	1596, 1559, 1543, 1508, 1479
4	3176	1580, 1541
$\mathbf{5}^{+}PF_6^{-}$	… …	1603, 1570, 1521, 840 (PF_6^{-})
6	… …	1600, 1577, 1518

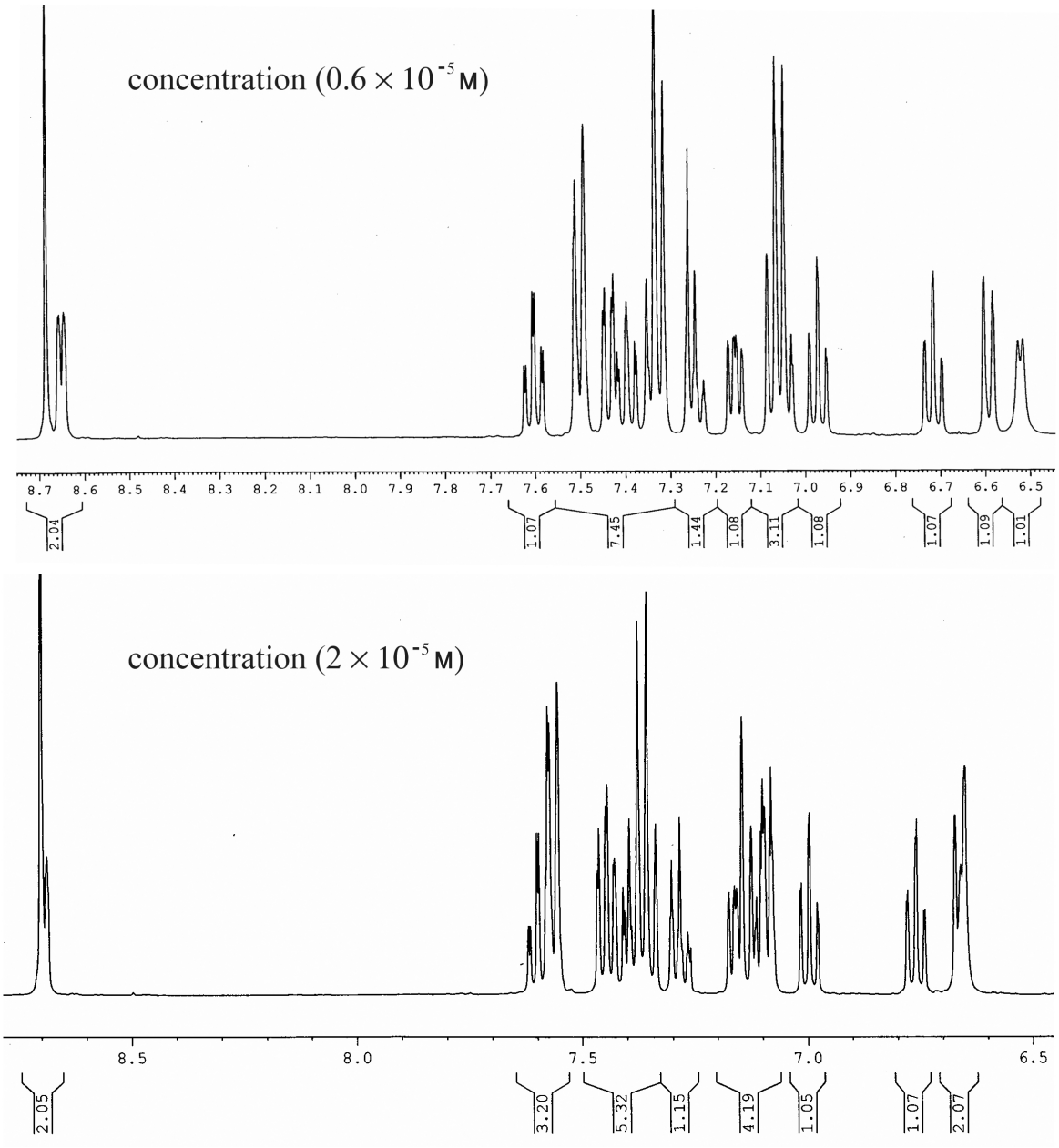


Fig. S1 ^{1}H NMR spectra (6.5-8.8 δ/ppm) of L_3H_2 in $CDCl_3$ with the concentration of 2 x 10^{-5}M (bottom) and 0.6 x 10^{-5} M (top)

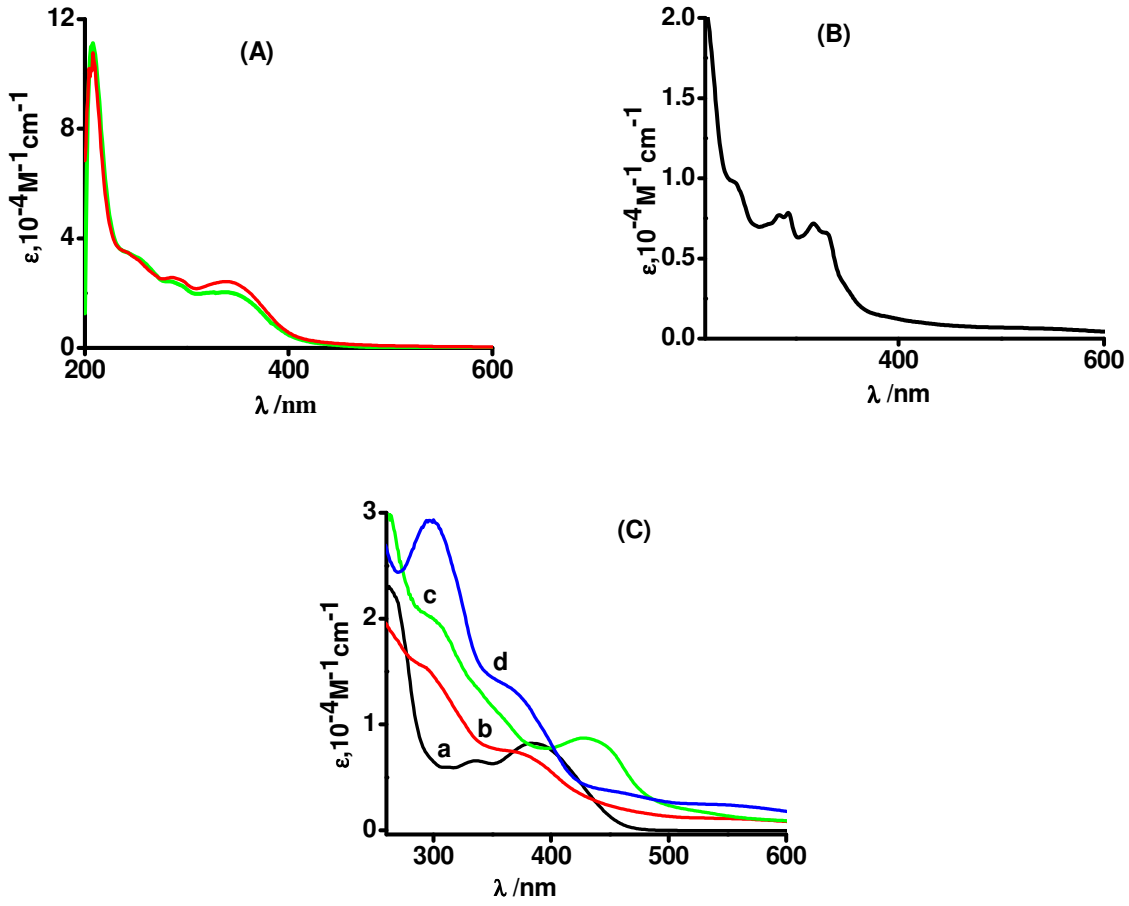


Fig. S2 Absorption spectra of (A) **1** (green) and **2** (red) (B) **4** and (C) comparative UV-vis spectra of (a) L_3H_2, (b) **4** (c) [L_3H_2 + Co^{II}] (1:1) and (d) [L_3H_2 + Fe^{II}] (1:1) mixtures in MeOH at 298 K.

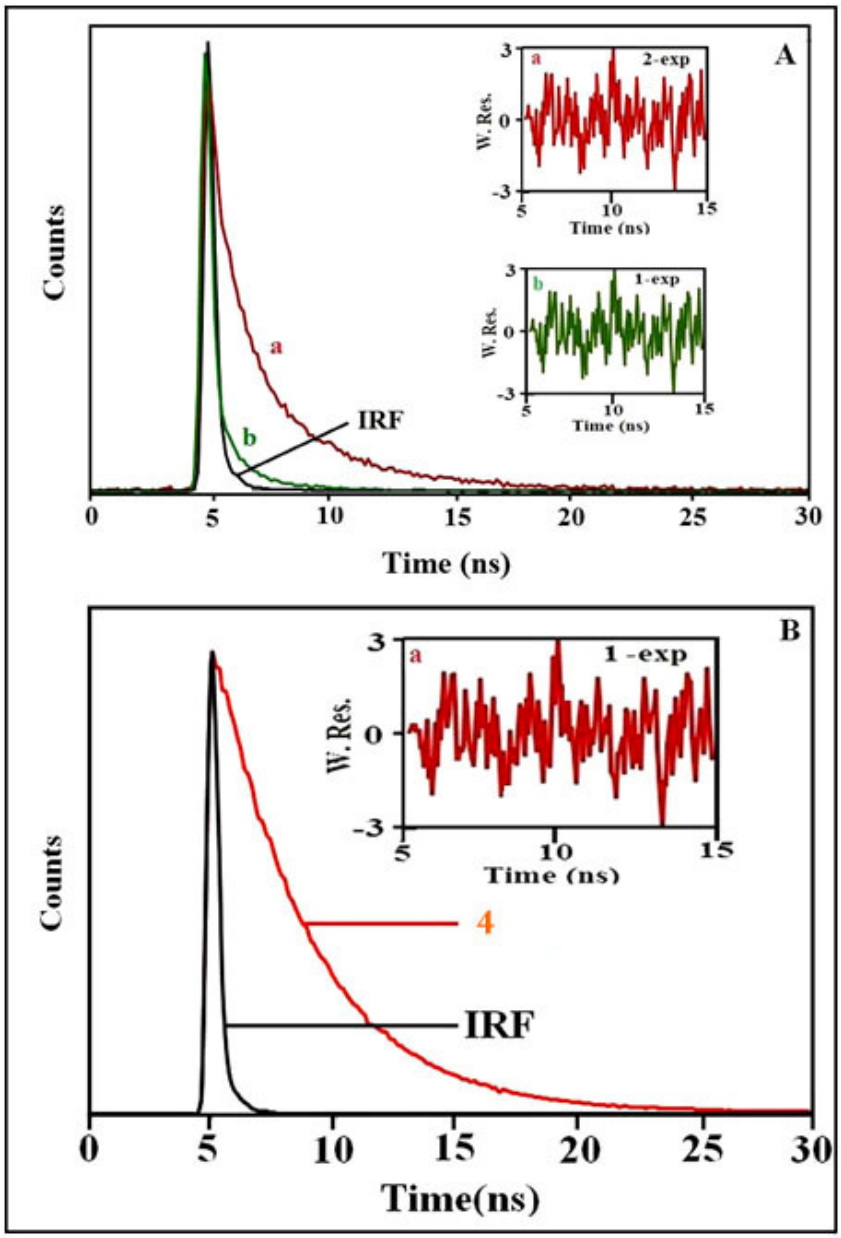
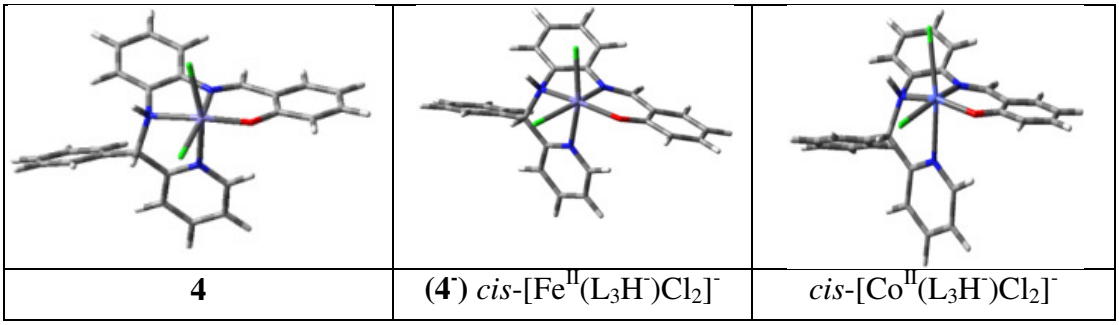


Fig. S3 (A) Representative fluorescence decay of L_3H_2 (0.4×10^{-4} M) in CH_3OH at 298 K (a) $\lambda_{monitored}$ = 470 nm, (b) $\lambda_{monitored}$ = 525 nm; λ_{ex} = 290 nm (LED); excitation band-pass = 20 nm, emission band-pass = 15 nm. (B) Representative fluorescence decay of (a) **4** complex, $\lambda_{monitored}$ = 450 nm in CH_3OH at 298 K. λ_{ex}= 290 nm (LED); excitation band-pass = 20 nm, emission band-pass = 15 nm.



4	(**4**$^{-}$) *cis*-[$Fe^{II}(L_3H^{-})Cl_2]^{-}$	*cis*-[$Co^{II}(L_3H^{-})Cl_2]^{-}$

Fig. S4 Gas phase optimized geometries of **4**: (Fe-O(1), 1.914; Fe-N(9), 2.215; Fe-N(16), 2.265; Fe-N(29), 2.293, Fe-Cl(1), 2.311; Fe-Cl(2), 2.324 Å); *cis*-$[Fe^{II}(L_3H^{-})Cl_2]^{-}$ (**4**$^{-}$): (Fe-O(1), 2.037; Fe-N(9), 2.262; Fe-N(16), 2.314; Fe-N(29), 2.348, Fe-Cl(1), 2.453; Fe-Cl(2), 2.489 Å) and *cis*-$[Co^{II}(L_3H^{-})Cl_2]^{-}$: (Co-O(1), 2.039; Co-N(9), 2.236; Co-N(16), 2.284; Co-N(29), 2.348, Co-Cl(1), 2.416; Co-Cl(2), 2.450 Å).

Table S2 Selected experimental bond lengths (Å) and angles (˚) of **1**

Zn(1)-N(2)	2.1463(14)	N(2)-Zn(1)-N(1)	74.08(5)
Zn(1)-N(1)	2.1672(16)	N(2)-Zn(1)-N(3)	73.69(6)
Zn(1)-N(3)	2.2102(16)	N(1)-Zn(1)-N(3)	138.84(6)
Zn(1)-Cl(2)	2.2449(5)	N(2)Zn(1)-Cl(2)	104.63(4)
Zn(1)-Cl(1)	2.2770(5)	N(1)-Zn(1)-Cl(2)	109.01(5)
N(3)-C(14)	1.422(2)	N(3)-Zn(1)-Cl(2)	103.38(5)
C(13)-C(14)	1.397(3)	N(2)-Zn(1)-Cl(1)	142.99(4)
N(2)-C(13)	1.402(2)	N(1)-Zn(1)-Cl(1)	94.10(4)
N(2)-C(6)	1.275(2)	N(3)-Zn(1)-Cl(1)	96.45(4)
C(5)-C(6)	1.486(2)	Cl(2)-Zn(1)-Cl(1)	112.369(19)
C(6)-C(7)	1.486(2)		
N(1)-C(5)	1.345(2)		

Table S3 Selected experimental bond lengths (Å) and angles (˚) of **2**

Zn(1)-N(2)	2.158(2)	N(2)-Zn(1)-N(1)	74.23(9)
Zn(1)-N(1)	2.158(3)	N(2)-Zn(1)-N(3)	73.85(9)
Zn(1)-N(3)	2.199(3)	N(1)-Zn(1)-N(3)	138.91(10)
Zn(1)-Br(2)	2.3843(6)	N(2)-Zn(1)-Br(2)	103.78(7)
Zn(1)-Br(1)	2.4353(5)	N(1)-Zn(1)-Br(2)	108.84(8
N(3)-C(14)	1.434(4)	N(3)-Zn(1)-Br(2)	103.36(8)
C(13)-C(14)	1.397(4)	N(2)-Zn(1)-Br(1)	145.96(7)
N(2)-C(13)	1.408(4)	N(1)-Zn(1)B-r(1)	96.04(7)
N(2)-C(6)	1.282(4)	N(3)-Zn(1)-Br(1)	96.10(7)
C(5)-C(6)	1.481(4)	Br(2)-Zn(1)-Br(1)	110.205(18)
C(6)-C(7)	1.493(4)		
N(1)-C(5)	1.356(4)		

Table S4 Selected experimental bond lengths (Å) and angles (˚) of **3**

Ru(1)-N(8)	1.963(2)	N(1)-Ru(1)-N(15)	160.37(10)
Ru(1)-N(1)	2.028(3)	N(8)-Ru(1)-P(30)	95.06(8)
Ru(1)-N(15)	2.138(3)	N(1)-Ru(1)-P(30)	93.87(7)
Ru(1)-P(30)	2.2846(8)	N(15)-Ru(1)-P(30)	94.96(8)
Ru(1)-C(l2)	2.4345(8)	N(8)-Ru(1)-C(l2)	172.42(8)
Ru(1)-C(l1)	2.4555(8)	N(1)-Ru(1)-C(l2)	97.76(7)
N(1)-C(6)	1.381(4)	N(15)-Ru(1)-C(l2)	99.35(8)
C(6)-C(7)	1.455(4)	P(30)-Ru(1)-C(l2)	92.39(3)
C(7)-C(16)	1.489(4)	N(8)-Ru(1)-C(l1)	85.37(8)
C(7)-N(8)	1.316(4)	N(1)-Ru(1)-C(l1)	87.15(7)
N(8)-C(9)	1.426(4)	N(15)-Ru(1)-C(l1)	84.16(7)
C(9)-C(14)	1.399(5)	P(30)-Ru(1)-C(l1)	178.94(3)
C(14)-N(15)	1.455(4)	C(l2)-Ru(1)-C(l1)	87.20(3)
		N(8)-Ru(1)-N(15)	81.39(11)

Table S5 Selected experimental and calculated bond lengths (Å) and angles (°) of **4**

	exptl	calcd		exptl	calcd
Fe(1)-O(1)	1.8923(12)	1.9144	C(17)-C(18)	1.525(2)	1.525
Fe(1)-N(9)	2.1403(15)	2.2147	C(18)-N(23)	1.343(2)	1.343
Fe(1)-N(16)	2.1923(14)	2.2649	O(1)-Fe(1)-N(9)	86.71(6)	86.09
Fe(1)-N(23)	2.1784(14)	2.2935	N(9)-Fe(1)-N(16)	77.48(5)	75.57
Fe(1)-Cl(1)	2.2990(5)	2.3113	N(23)-Fe(1)-N(16)	76.18(5)	73.28
Fe(1)-Cl(2)	2.3357(6)	2.3242	N(16)-Fe(1)-Cl(2)	96.12(4)	91.43
O(1)-C(2)	1.325(2)	1.3061	Cl(1)-Fe(1)-Cl(2)	94.13(2)	100.01
C(2)-C(7)	1.413(3)	1.435	O(1)-Fe(1)-Cl(1)	103.33(4)	105.09
C(7)-C(8)	1.435(3)	1.437	N(9)-Fe(1)-Cl(1)	92.81(4)	89.82
C(8)-N(9)	1.298(2)	1.299	N(16)-Fe(1)-Cl(1)	88.45(4)	88.46
N(9)-C(10)	1.419(2)	1.410	N(23)-Fe(1)-Cl(2)	85.82(4)	86.23
C(10)-C(15)	1.389(2)	1.411	N(9)-C(8)-C(7)	125.16(18)	126.66
C(15)-N(16)	1.460(2)	1.450	N(16)-C(17)-C(18)	110.02(13)	110.32
N(16)-C(17)	1.513(2)	1.509			

Table S6. Selected experimental bond lengths (Å) and angles (°) of **5**

Ru(1)-N(16)	1.9758(12)	N(16)-Ru(1)-N(9)	84.15(5)
Ru(1)-N(9)	2.0059(12)	N(16)-Ru(1)-O(1)	176.35(5)
Ru(1)-O(1)	2.0730(11)	N(9)-Ru(1)-O(1)	92.20(5)
Ru(1)-N(23)	2.0833(12)	N(16)-Ru(1)-N923)	79.67(5)
Ru(1)-P(30)	2.4170(3)	N(9)-Ru(1)-N(23)	163.82(5)
Ru(1)-P(30)	2.4171(3)	O(1)-Ru(1)-N(23)	103.98(4)
O(1)-C(2)	1.3036(18)	N(16)-Ru(1)-P(30)	92.945(7)
C(2)-C(3)	1.413(3)	N(9)-Ru(1)-P(30)	89.424(7)
C(7)-C(8)	1.434(2)	O(10-Ru(1)-P930)	87.005(7)
C(8)-N(9)	1.3053(18)	N(23)-Ru(1)-P(30)	91.394(7)
N(9)-C(10)	1.4267(19)	N(16)-Ru(1)-P(30)	92.945(6)
C(10)-C(15)	1.417(2)	N(9)-Ru(1)-P(30)	89.425(7)
C(15)-N(16)	1.4375(18)	O(1)-Ru(1)-P(30)	87.004(7)
N(16)-C(17)	1.3126(18)	N(23)-Ru(1)-P(30)	91.393(7)
C(17)-C(18)	1.4645(19)	P(30)-Ru(1)-P(30)	173.852(13)
C(17)-C(24)	1.487(2)		
C(18)-N(23)	1.3732(18)		

Table S7 Selected experimental bond lengths (Å) and angles (˚) of **6**

Ru(1)-N(8)	1.9644(11)	N(8)-Ru(1)-N(15)	82.30(5)
Ru(1)-N(15)	2.0423(11)	N(8)-Ru(1)-N(1)	79.35(5)
Ru(1)-N(1)	2.0554(11)	N(15)-Ru(1)-N(1)	159.03(5)
Ru(1)-P(30)	2.2952(4)	N(8)-Ru(1)-P(30)	95.52(3)
Ru(1)-C(l2)	2.4357(4)	N(15)-Ru(1)-P(30)	96.03(3)
Ru(1)-C(l1)	2.4726(4)	N(1)-Ru(1)-P(30)	95.75(3)
C(16)-C(17)	1.4741(18)	N(8)-Ru(1)-C(l2)	73.95(3)
N(15)-C(16)	1.2910(17)	N(15)-Ru(1)-C(l2)	94.22(3)
C(14)-N(15)	1.4288(17)	N(1)-Ru(1)-C(l2)	103.12(3)
C(9)-C(14)	1.4046(19)	P(30)-Ru(1)-C(l2)	89.750(14)
N(8)-C(9)	1.4236(16)	N(8)-Ru(1)-C(l1)	85.01(3)
C(7)-N(8)	1.3115(17)	N(15)-Ru(1)-C(l1)	83.64(3)
C(6)-C(7)	1.4656(18)	N(1)-Ru(1)-C(l1)	84.74(3)
C(7)-C(23)	1.4809(18)	P(30)-Ru(1)-C(l1)	179.333(13)
N(1)-C(6)	1.3732(17)	C(l2)-Ru(1)-C(l1)	89.695(13)

Table S8 Singlet state lifetime data of L_3H_2, **4** and [L_3H_2 + Al^{III}] (1:1) mixtures at 298 K

Substrate (solvent)	Concentration	λ_{exc} (nm)	λ_{max} (nm)	τ_1 (ns)	τ_2 (ns)	χ^2	τ_{av} (ns)
L_3H_2 (CH_3OH)	0.01 ×10^{-4} M	290	470	3.8 (57.8%)	1.2 (42.2%)	0.872	2.6
	0.15 ×10^{-4} M	290	470	3.7 (45.5%)	1.2 (54.5%)	1.095	2.3
			525	3.7 (3.8%)	1.1 (96.2%)	0.956	1.2
	0.2 ×10^{-4} M	290	470	3.7 (32.4%)	1.1 (67.6%)	0.971	1.9
			525	3.7 (6.2%)	1.1 (93.8%)	1.301	1.3
	0.4×10^{-4} M	290	470	3.7 (27.2%)	1.0 (72.8%)	0.828	1.8
			525	3.7 (6.6%)	1.1 (93.4%)	1.055	1.3
		405	525	1.1 (100%)	-	0.933	-
	0.6 ×10^{-4} M	290	470	3.7 (20.1%)	1.1 (79.9%)	0.982	1.6
	0.8 ×10^{-4} M	290	470	3.8 (15.5%)	1.1 (84.5%)	0.817	1.5
			525	3.7 (2.2%)	1.1 (97.8%)	0.828	1.2
		405	525	1.1 (100%)	-	1.033	-
L_3H_2 (DMSO)	0.4 ×10^{-4} M	290	480	3.7 (26.4%)	1.1 (73.6%)	1.242	1.8
			525	3.7 (4.7%)	1.1 (95.3%)	1.215	1.2
		405	525	1.1 (100%)	-	0.890	-
L_3H_2 (CH_2Cl_2)	0.4 ×10^{-4} M	290	470	3.7 (90.0%)	1.1 (10.0%)	0.956	3.4
4 (CH_3OH)	0.1 × 10^{-4} M	290	450	3.7 (100%)	-	1.101	-
[L_3H_2 + Al^{III}] (CH_3OH)	0.1 × 10^{-4} M	290	450	3.7 (100%)	-	1.203	-

Table S9 Gas phase optimized coordinates of L_3H_2

Center Number	Atomic Number	Atomic Type	Coordinates (Angstroms) X	Y	Z
1	8	0	5.257478	2.900391	14.048259
2	6	0	5.995210	3.984406	14.361779
3	6	0	6.102789	4.350090	15.711714
4	6	0	6.857546	5.460592	16.077970
5	6	0	7.519894	6.234088	15.110354
6	6	0	7.413864	5.877535	13.772242
7	6	0	6.659014	4.756851	13.367648
8	6	0	6.568682	4.421578	11.957319
9	7	0	5.921627	3.386713	11.532517
10	6	0	5.738640	3.140345	10.158765
11	6	0	5.399685	4.177963	9.272541
12	6	0	5.065329	3.923992	7.943156
13	6	0	5.064420	2.604387	7.481901
14	6	0	5.424148	1.567278	8.340957
15	6	0	5.770999	1.802152	9.684540
16	7	0	6.079944	0.717425	10.519335
17	6	0	7.263423	0.672014	11.400536
18	6	0	8.602547	0.922569	10.701942

19	6	0	8.836321	0.622360	9.353507
20	6	0	10.100923	0.864474	8.814379
21	6	0	11.092516	1.402306	9.635271
22	6	0	10.762672	1.679443	10.965013
23	7	0	9.553458	1.452720	11.489703
24	6	0	7.228459	-0.654174	12.160862
25	6	0	7.816522	-1.820400	11.653093
26	6	0	7.713427	-3.031173	12.346482
27	6	0	7.026325	-3.087208	13.561404
28	6	0	6.442797	-1.926015	14.079094
29	6	0	6.543167	-0.719603	13.383129
30	1	0	5.586779	3.746434	16.452322
31	1	0	6.932786	5.729243	17.128741
32	1	0	8.106873	7.099110	15.404405
33	1	0	7.919883	6.465439	13.008843
34	1	0	7.088852	5.089325	11.257193
35	1	0	5.333894	5.190624	9.661580
36	1	0	4.782738	4.741924	7.286462
37	1	0	4.790888	2.380463	6.454057
38	1	0	5.439565	0.543402	7.970478
39	1	0	5.911596	-0.175145	10.067402
40	1	0	7.167749	1.469310	12.137239
41	1	0	8.041548	0.220748	8.733476

42	1	0	10.304884	0.640327	7.770252
43	1	0	12.090414	1.609964	9.259580
44	1	0	11.501209	2.108087	11.640810
45	1	0	8.373760	-1.786922	10.720216
46	1	0	8.178916	-3.926023	11.940502
47	1	0	6.950918	-4.026182	14.104130
48	1	0	5.911669	-1.958049	15.027150
49	1	0	6.087142	0.180132	13.789304
50	1	0	5.278162	2.794723	13.055460

Table S10 Gas phase optimized coordinates of *cis*-[$Fe^{III}(L_3H^-)Cl_2$] (**4**)

Center Number	Atomic Number	Atomic Type	Coordinates (Angstroms) X	Y	Z
1	26	0	6.032020	2.537080	13.626754
2	17	0	3.749084	2.878609	13.508123
3	17	0	6.128646	1.072087	15.428642
4	8	0	6.744655	4.169558	14.328250
5	6	0	7.112270	5.324219	13.840659
6	6	0	7.488890	6.359469	14.735381
7	6	0	7.932631	7.585761	14.266693
8	6	0	8.024463	7.844776	12.883601

9	6	0	7.652127	6.854621	11.991723
10	6	0	7.185166	5.590008	12.432364
11	6	0	6.767268	4.650162	11.427869
12	7	0	6.268334	3.468167	11.631220
13	6	0	5.749896	2.690791	10.574745
14	6	0	5.384505	3.208538	9.317925
15	6	0	4.761632	2.403937	8.367289
16	6	0	4.461704	1.070592	8.660820
17	6	0	4.812323	0.546654	9.904920
18	6	0	5.472497	1.335180	10.851918
19	7	0	5.789287	0.819459	12.170373
20	6	0	6.933308	-0.150180	12.341607
21	6	0	8.247093	0.605770	12.516049
22	6	0	9.496781	0.045201	12.231389
23	6	0	10.651462	0.752380	12.567971
24	6	0	10.531280	1.995402	13.188621
25	6	0	9.251415	2.482038	13.445713
26	7	0	8.143832	1.804860	13.112710
27	6	0	6.964953	-1.305841	11.354290
28	6	0	7.480945	-1.178976	10.054497
29	6	0	7.474010	-2.264458	9.175983
30	6	0	6.947395	-3.495393	9.581641
31	6	0	6.430735	-3.634559	10.872358

32	6	0	6.442887	-2.546316	11.750151
33	1	0	7.414905	6.151046	15.798447
34	1	0	8.212932	8.358594	14.978649
35	1	0	8.373652	8.808378	12.525038
36	1	0	7.703701	7.042928	10.920697
37	1	0	6.882805	5.008600	10.399864
38	1	0	5.531456	4.260591	9.097908
39	1	0	4.475444	2.831152	7.409894
40	1	0	3.944864	0.448629	7.935647
41	1	0	4.566733	-0.481889	10.149401
42	1	0	4.953628	0.382598	12.560867
43	1	0	6.732796	-0.569084	13.335808
44	1	0	9.564011	-0.930634	11.764981
45	1	0	11.630182	0.330792	12.354996
46	1	0	11.402451	2.574991	13.477228
47	1	0	9.092043	3.431471	13.945071
48	1	0	7.889355	-0.227819	9.724168
49	1	0	7.876877	-2.147615	8.173165
50	1	0	6.943829	-4.339786	8.897298
51	1	0	6.024129	-4.587794	11.199715
52	1	0	6.046714	-2.663746	12.756912

Table S11 Gas phase optimized coordinates of *cis*-$[Fe^{II}(L_3H^-)Cl_2]^-$ (**4**$^-$)

Center Number	Atomic Number	Atomic Type	Coordinates (Angstroms) X	Y	Z
1	26	0	5.858994	2.503805	13.683924
2	17	0	3.425241	2.770743	13.534278
3	17	0	5.918638	0.717216	15.416527
4	8	0	6.591923	4.275999	14.369901
5	6	0	7.077771	5.337120	13.837352
6	6	0	7.520210	6.412118	14.681447
7	6	0	8.098656	7.556756	14.170228
8	6	0	8.277478	7.725323	12.775945
9	6	0	7.847728	6.719078	11.930321
10	6	0	7.241892	5.527703	12.409526
11	6	0	6.791134	4.581727	11.427865
12	7	0	6.191301	3.451298	11.657250
13	6	0	5.665487	2.690498	10.603258
14	6	0	5.264203	3.235652	9.366662
15	6	0	4.638720	2.449843	8.400536
16	6	0	4.372660	1.101692	8.655709
17	6	0	4.754266	0.551045	9.880987
18	6	0	5.410602	1.319388	10.847873

19	7	0	5.737959	0.780372	12.144441
20	6	0	6.912593	-0.126705	12.332741
21	6	0	8.209527	0.659402	12.545587
22	6	0	9.472655	0.170271	12.185968
23	6	0	10.612077	0.883466	12.563094
24	6	0	10.464870	2.058641	13.298702
25	6	0	9.171438	2.472110	13.621733
26	7	0	8.080014	1.793981	13.252874
27	6	0	7.004320	-1.283244	11.347033
28	6	0	7.469835	-1.128865	10.030489
29	6	0	7.507443	-2.213567	9.151037
30	6	0	7.075908	-3.476728	9.570254
31	6	0	6.608324	-3.645043	10.876637
32	6	0	6.576058	-2.556299	11.753864
33	1	0	7.378711	6.277931	15.750675
34	1	0	8.420260	8.343549	14.851599
35	1	0	8.732816	8.629330	12.379823
36	1	0	7.963013	6.835042	10.852265
37	1	0	6.988614	4.881679	10.389130
38	1	0	5.380254	4.300215	9.188700
39	1	0	4.321689	2.903255	7.463671
40	1	0	3.853778	0.490722	7.921185
41	1	0	4.529482	-0.488243	10.102220

42	1	0	4.914122	0.341123	12.555782
43	1	0	6.711595	-0.546163	13.328687
44	1	0	9.565321	-0.756252	11.630820
45	1	0	11.599440	0.517447	12.290254
46	1	0	11.322802	2.641933	13.621052
47	1	0	8.988372	3.370836	14.203309
48	1	0	7.801235	-0.152120	9.689480
49	1	0	7.867950	-2.069760	8.134901
50	1	0	7.103916	-4.320514	8.884426
51	1	0	6.270684	-4.621748	11.215762
52	1	0	6.212053	-2.692052	12.770265

Table S12 Gas phase optimized coordinates of *cis*-$[Co^{II}(L_3H^-)Cl_2]^-$

Center Number	Atomic Number	Atomic Type	Coordinates (Angstroms) X	Y	Z
1	17	0	3.577013	2.826417	13.437141
2	17	0	6.057223	0.836687	15.424386
3	8	0	6.794067	4.201489	14.400434
4	6	0	7.129545	5.323995	13.881343
5	6	0	7.539976	6.398191	14.745138
6	6	0	7.980928	7.610888	14.255299

7	6	0	8.046003	7.857317	12.862865
8	6	0	7.642248	6.855174	11.999608
9	6	0	7.171517	5.595482	12.455884
10	6	0	6.734900	4.667332	11.449077
11	7	0	6.220641	3.491543	11.642229
12	6	0	5.717180	2.730357	10.576999
13	6	0	5.330305	3.269764	9.332829
14	6	0	4.737455	2.477468	8.352502
15	6	0	4.487345	1.124464	8.598490
16	6	0	4.853217	0.577736	9.829811
17	6	0	5.481613	1.351844	10.811295
18	7	0	5.789576	0.808976	12.112942
19	6	0	6.924823	-0.138615	12.317569
20	6	0	8.245950	0.611051	12.502540
21	6	0	9.496363	0.063603	12.185353
22	6	0	10.652313	0.763670	12.534852
23	6	0	10.533212	1.983449	13.200131
24	6	0	9.250117	2.452838	13.485835
25	7	0	8.143982	1.785401	13.142982
26	6	0	6.975730	-1.323312	11.361967
27	6	0	7.473810	-1.226781	10.051880
28	6	0	7.475128	-2.334782	9.201115
29	6	0	6.975317	-3.564427	9.643599

30	6	0	6.475893	-3.675424	10.944315
31	6	0	6.479525	-2.563448	11.792507
32	1	0	7.488336	6.203643	15.813196
33	1	0	8.282664	8.391249	14.953169
34	1	0	8.395233	8.813905	12.482864
35	1	0	7.670581	7.029132	10.923495
36	1	0	6.862574	5.036004	10.421785
37	1	0	5.436061	4.334952	9.153278
38	1	0	4.433711	2.928660	7.410104
39	1	0	3.992324	0.507316	7.852715
40	1	0	4.636264	-0.464126	10.044903
41	1	0	4.946423	0.420109	12.535908
42	1	0	6.714691	-0.524395	13.325744
43	1	0	9.565993	-0.895463	11.684588
44	1	0	11.631134	0.353900	12.295302
45	1	0	11.405600	2.557906	13.498685
46	1	0	9.083683	3.384520	14.017953
47	1	0	7.859046	-0.276650	9.692507
48	1	0	7.861463	-2.235302	8.189127
49	1	0	6.975876	-4.426579	8.980416
50	1	0	6.086168	-4.625813	11.301855
51	1	0	6.091966	-2.655173	12.805132
52	27	0	5.963323	2.504866	13.632401