Supporting Information

For

Synthesis, Characterization, and Reactivity of the Heterometallic Dinuclear μ-PH_2 and μ-PPhH Complexes $FeMn(CO)_8(\mu\text{-}PH_2)$ and $FeMn(CO)_8(\mu\text{-}PPhH)$

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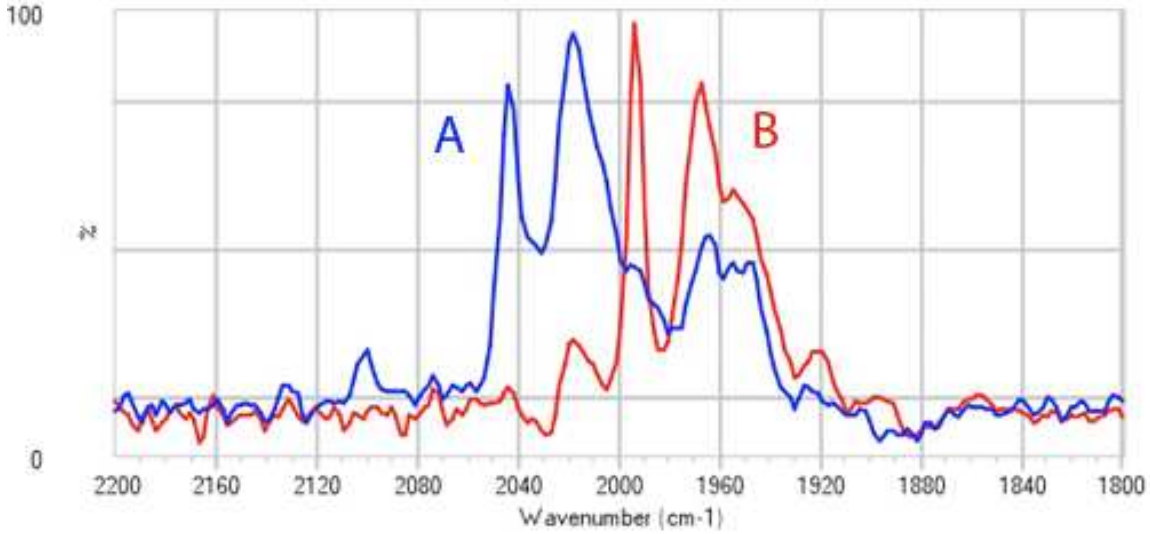

Figure S1. *In situ* FTIR spectrum of **1a** before (A) and after (B) addition of *n*-butyllithium to form **[2a]**$^-$ in THF.

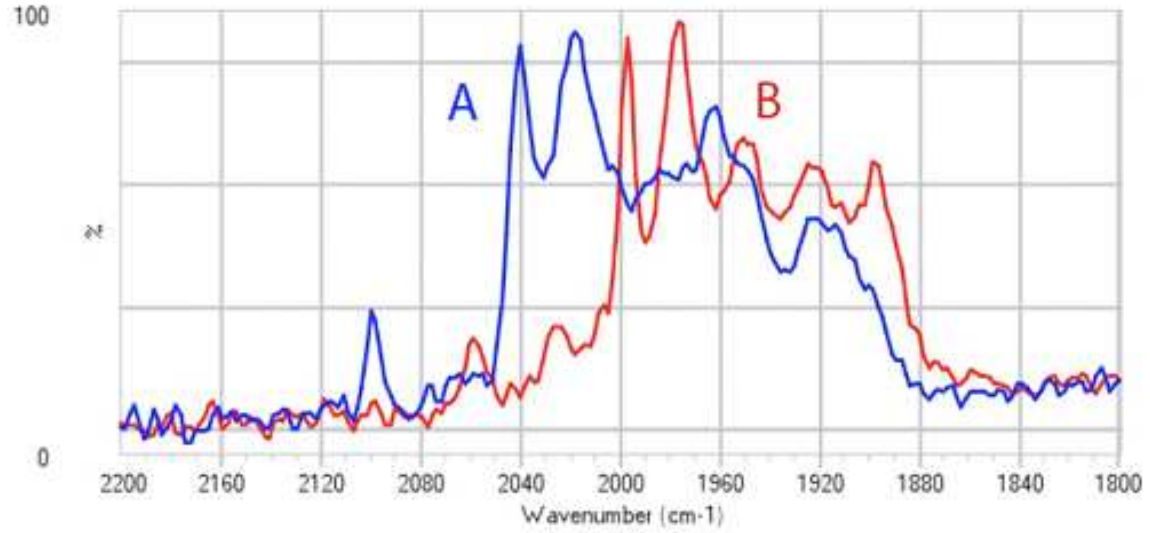

Figure S2. *In situ* FTIR spectrum of **1b** before (A) and after (B) addition of *n*-butyllithium to form **[2b]**$^-$ in THF.

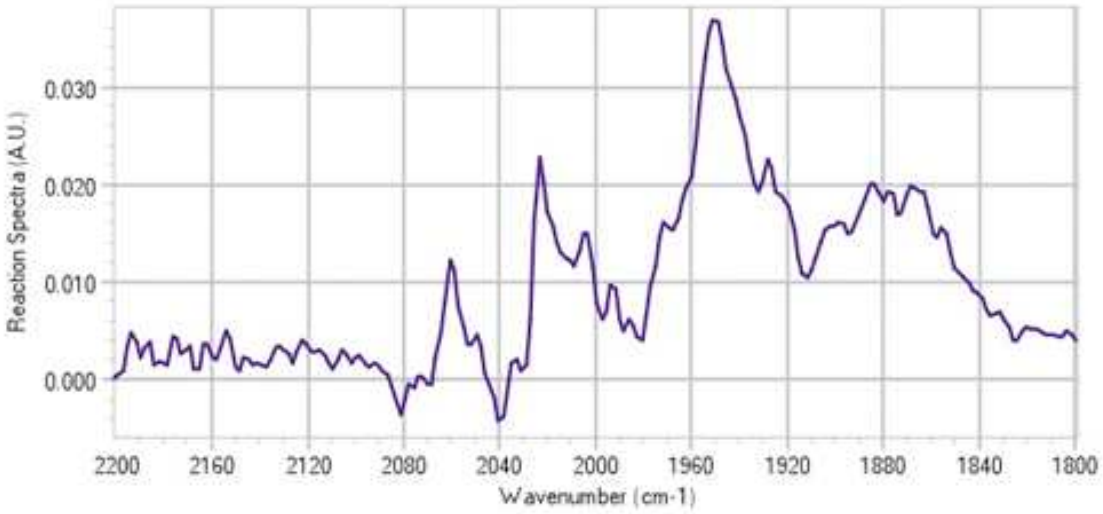

Figure S3. *In situ* FTIR spectrum obtained after stirring **[2a]**$^-$ at -40 °C for 30 minutes in THF. Exposure of this product to atmosphere immediately gave rise to **[4]**$^-$.

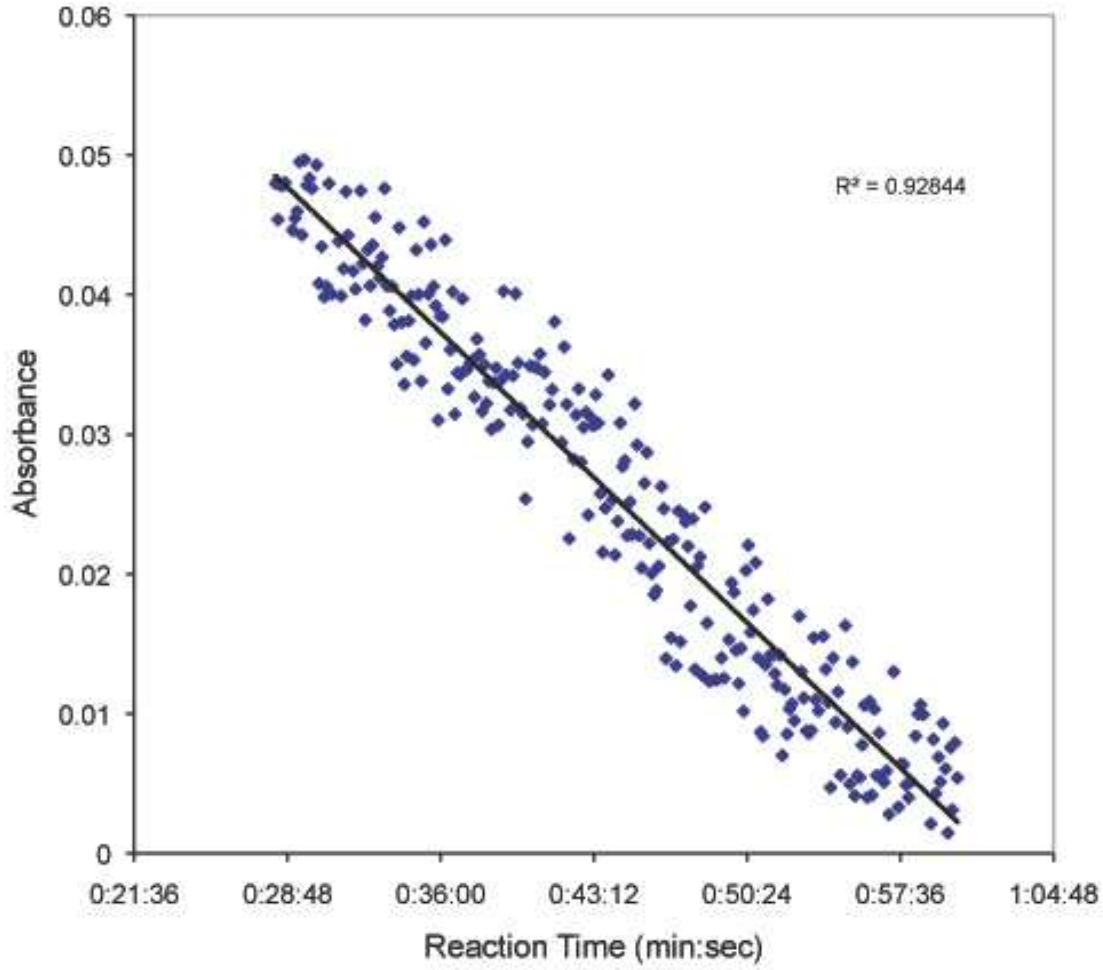

Figure S4. Change in IR absorbance of representative peak of **[2a]**$^-$ (1993 cm^{-1}) over time.

	1a	**1b**	**3a**	**3b**
Formula	$C_8H_2FeMnO_8P$	$C_{14}H_6FeMnO_8P$	$C_{19}H_5FeMn_2O_{13}P$	$C_{32}H_{20}AuFeMnO_8P_2$
Formula weight	367.86	443.95	637.93	902.18
crystal system	triclinic	monoclinic	triclinic	orthorhombic
space group	P-1	P 21/c	P-1	Pbcn
a (Å)	7.8647(8)	10.242(4)	12.325(2)	18.4784(14)
b (Å)	9.2226(10)	14.193(6)	14.204(3)	12.6296(9)
c (Å)	9.3681(10)	11.935(5)	14.926(3)	28.196(2)
α (deg)	90.966(2)	90.00	107.600(3)	90.00
β (deg)	91.141(2)	97.927(8)	106.384(3)	90.00
γ (deg)	110.032(2)	90.00	95.561(4)	90.00
V ($Å^3$)	638.06(12)	1718.4(13)	2341.8(8)	6580.3(8)
Z	2	4	4	8
D_{calc} ($g \cdot cm^{-3}$)	1.915	1.716	1.809	1.821
λ (Mo Kα), (Å)	0.71073	0.71073	0.71073	0.71073
T (K)	223(2)	293(2)	213(2)	213(2)
θ_{max} (deg)	28.33	28.370	28.420	28.29
abs. coeff (mm^{-1})	2.280	1.710	1.808	5.407
rflns(coll)	5030	20831	23216	76896
rflns (unique)	2066	4226	9627	8102
Params	181	230	649	407
F(000)	360	880	1256	3488
R_1 [$I > 2\sigma(I)$]	0.0276	0.0775	0.0310	0.0249
wR_2 [$I > 2\sigma(I)$]	0.0591	.1328	0.0532	0.0551
GOF	0.795	1.122	0.453	1.111

Table S1: X-ray collection and refinement parameters for complexes **1a**, **1b**, **3a**, and **3b**.