Electronic Supplementary Information

Classical and non-classical phosphine-Ru(II)-hyidrides in aqueous solution: Many, various, and useful.

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Contents

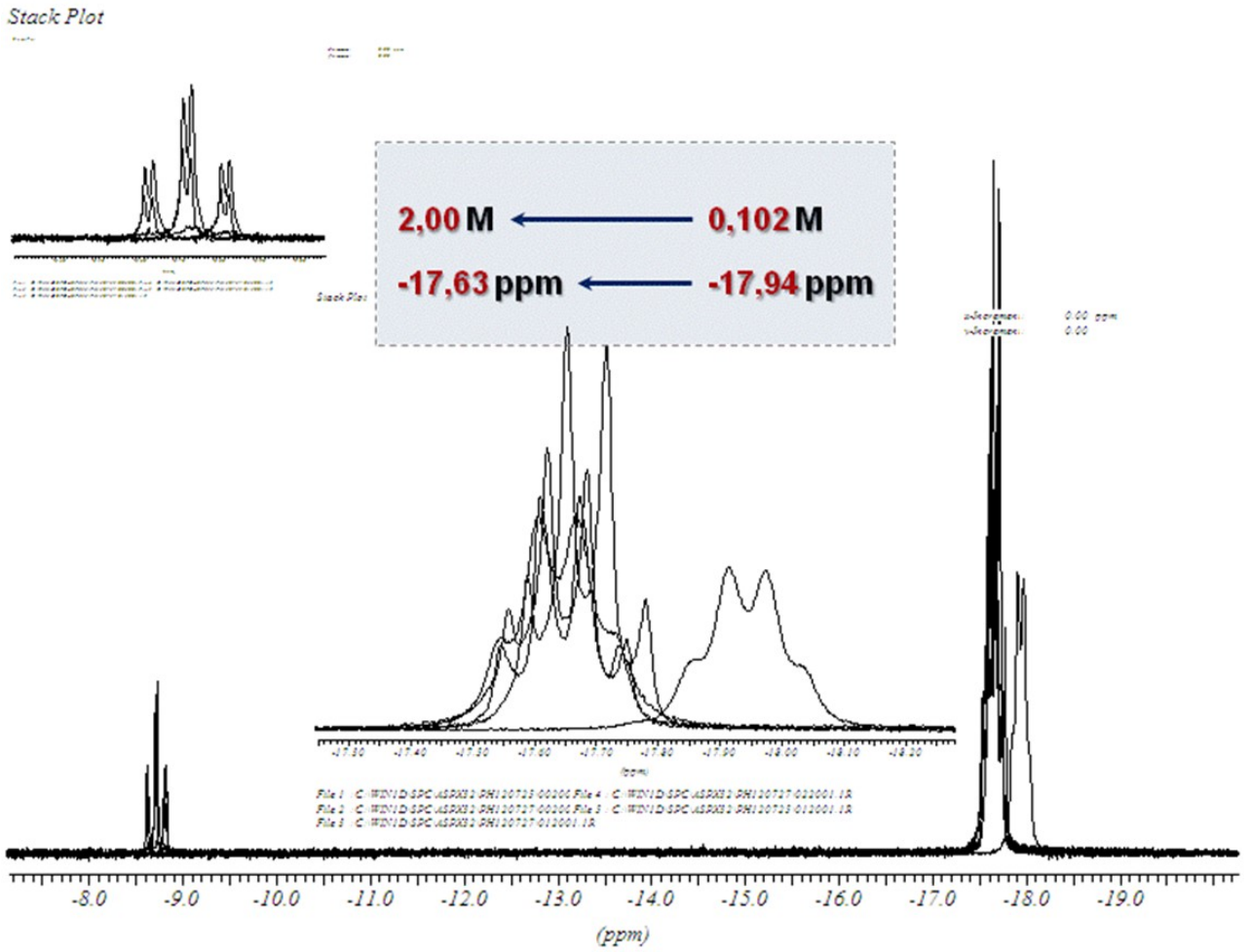

Figure S1:
Effect of increasing NaCl concentration on the ^{1}H NMR spectra of [RuHCl(*m*tppms)$_3$] (**1**).

[Ru] = 0.051M; [*m*tppms] = 0.202M; 0.6mL 0.1M phosphoric acid/10% CD_3OD; $P(H_2)$=1bar

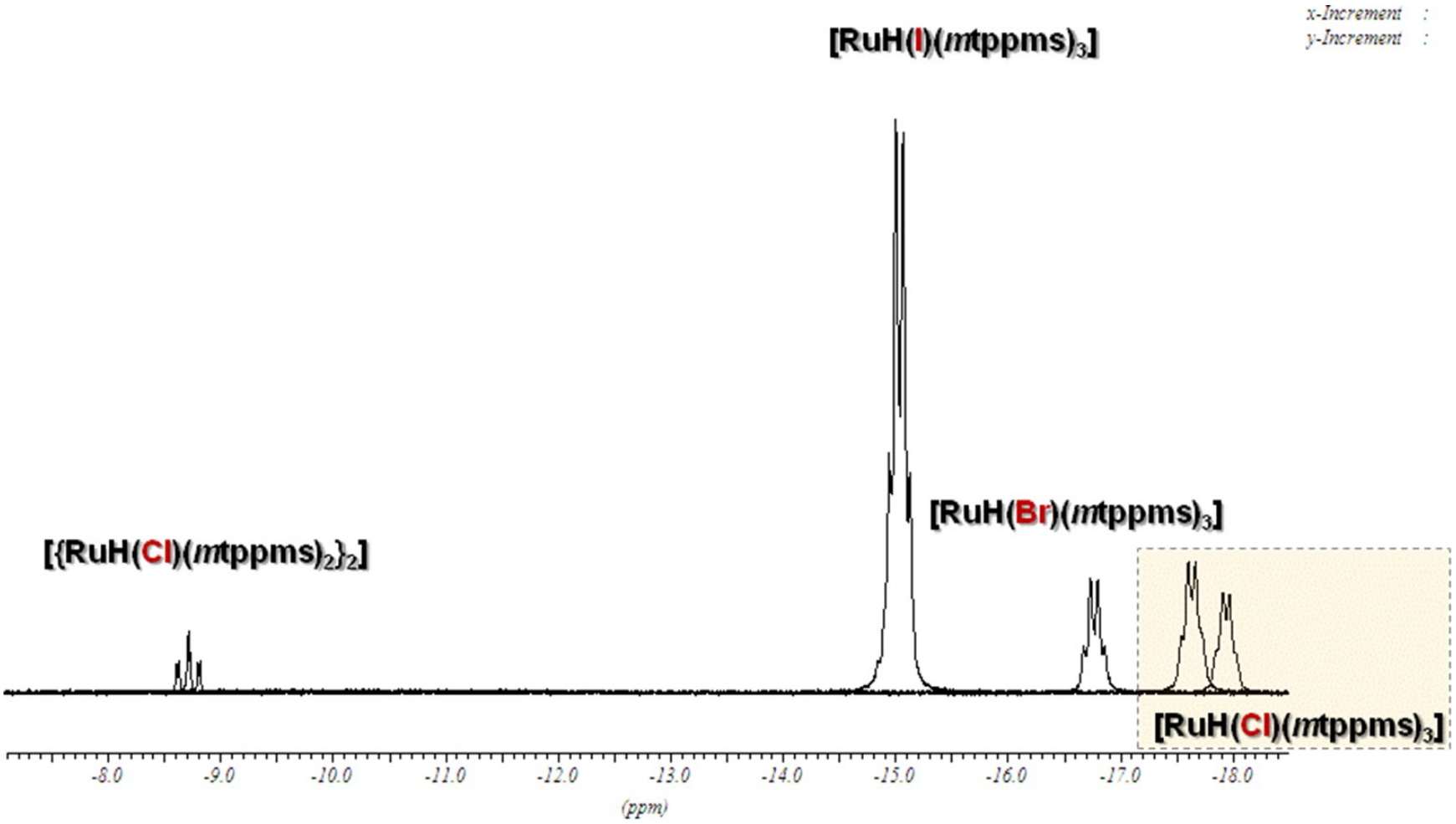

Figure S2:
^{1}H NMR spectra of [RuHCl(*m*tppms)$_3$] (**1**), [{RuHCl(*m*tppms)$_2$}$_2$] (**3**), [RuHBr(*m*tppms)$_3$] (**9**) and [RuHI(*m*tppms)$_3$] (**10**).

[Ru] = 0.051M; [*m*tppms] = 0.202M; 0.6mL 0.1M phosphoric acid/10% CD_3OD; $P(H_2)$=1bar

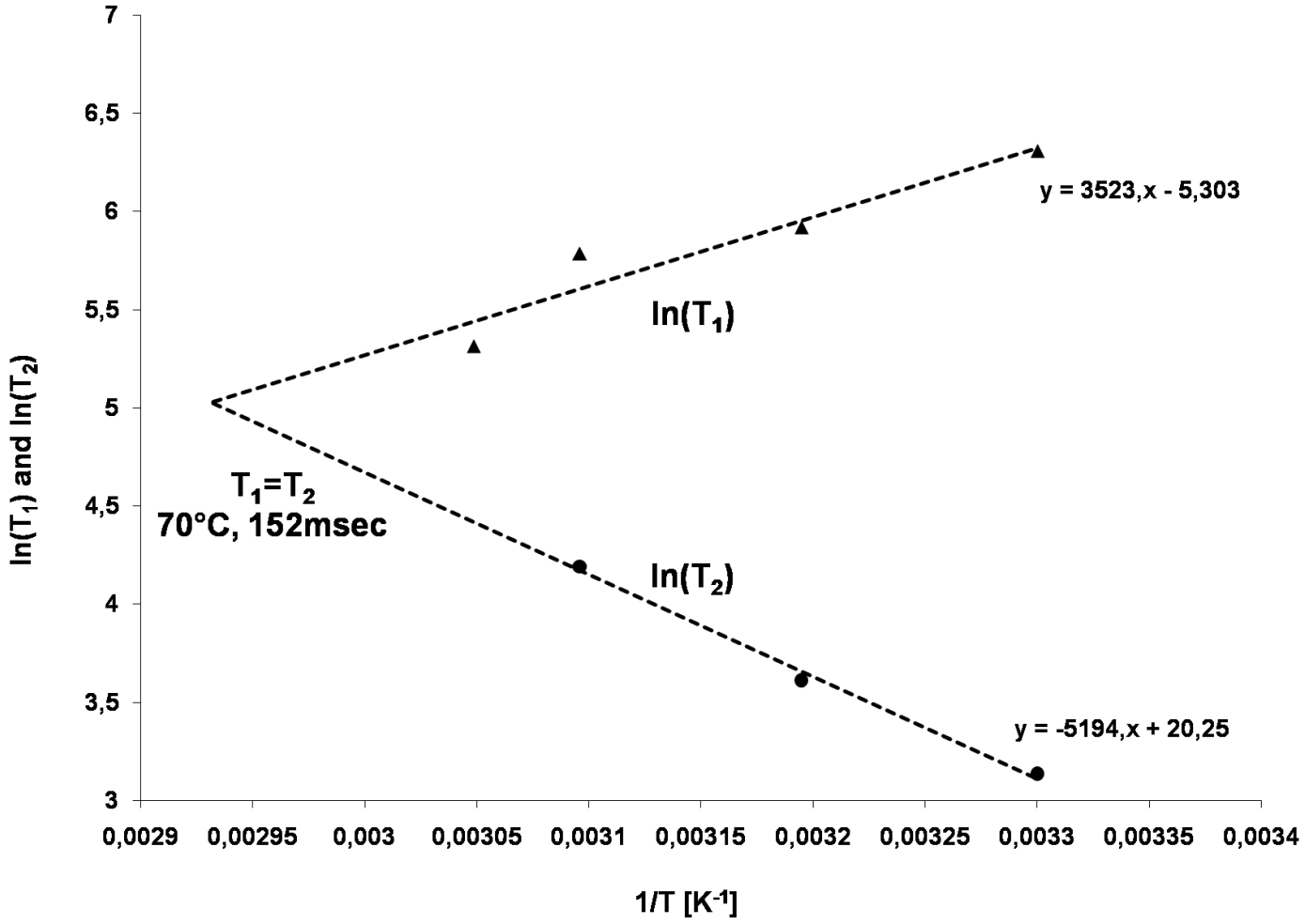

Figure S3:
Determination of $T_{1(min)}$ for *trans*-[RuH_2(*m*tppms)$_4$] (**11**).

[Ru] = 0.042M; [*m*tppms] = 0.17M; 0.6mL 0.2M phosphate buffer pH=3.01/10% CD_3OD; $P(H_2)$>5bar

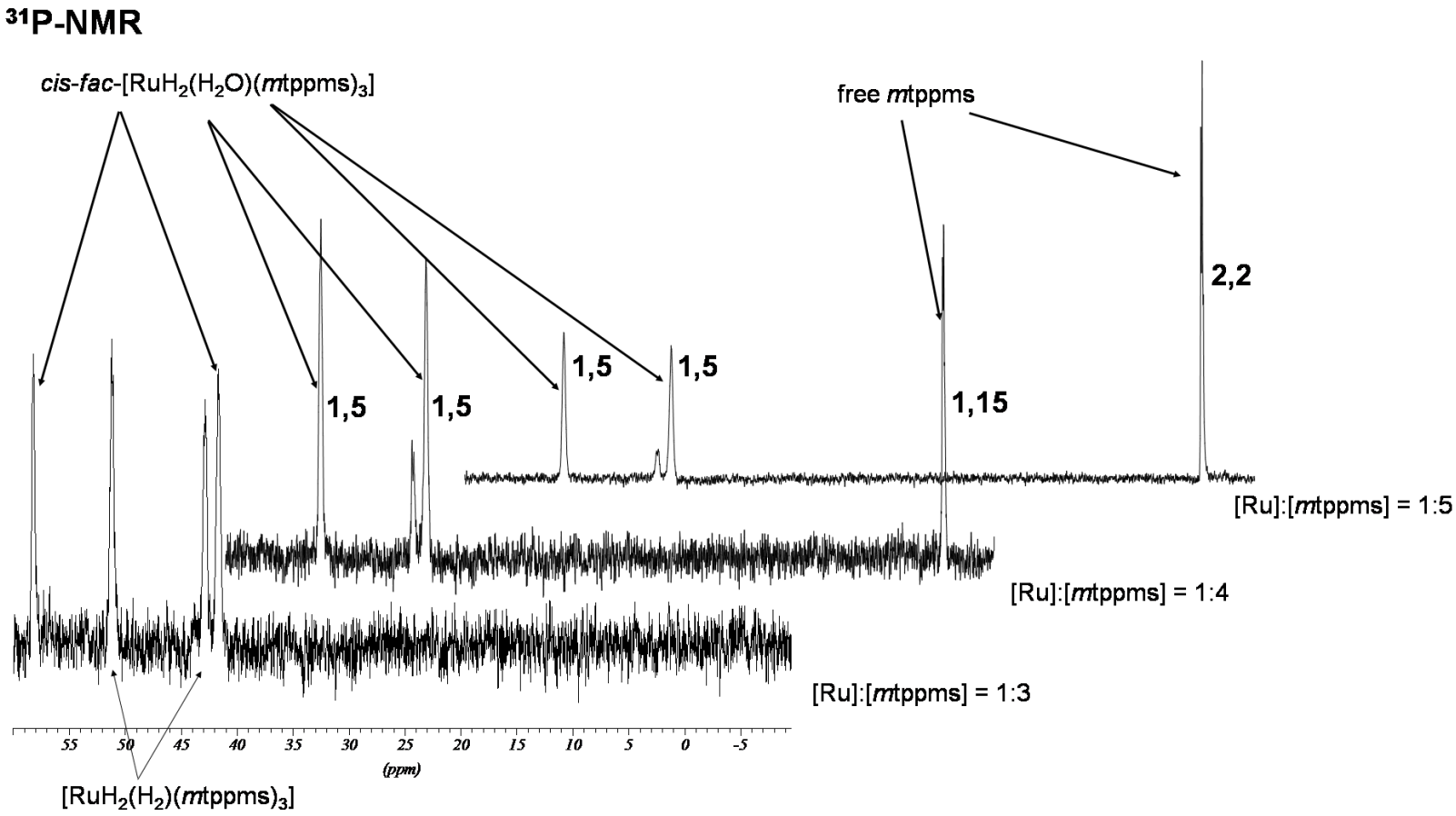

Figure S4:
Determination of the composition of *cis-fac*-[$RuH_2(H_2O)$(*m*tppms)$_3$] (**12**) from integrated intensities of ^{31}P-NMR signals in the presence of added *m*tppms.

[Ru] = 0.042M; [*m*tppms] = 0.126M, 0.168M, 0.21M; 0.6mL 0.2M phosphate buffer pH=10.0/10% CD_3OD; *P*(H_2)=1bar

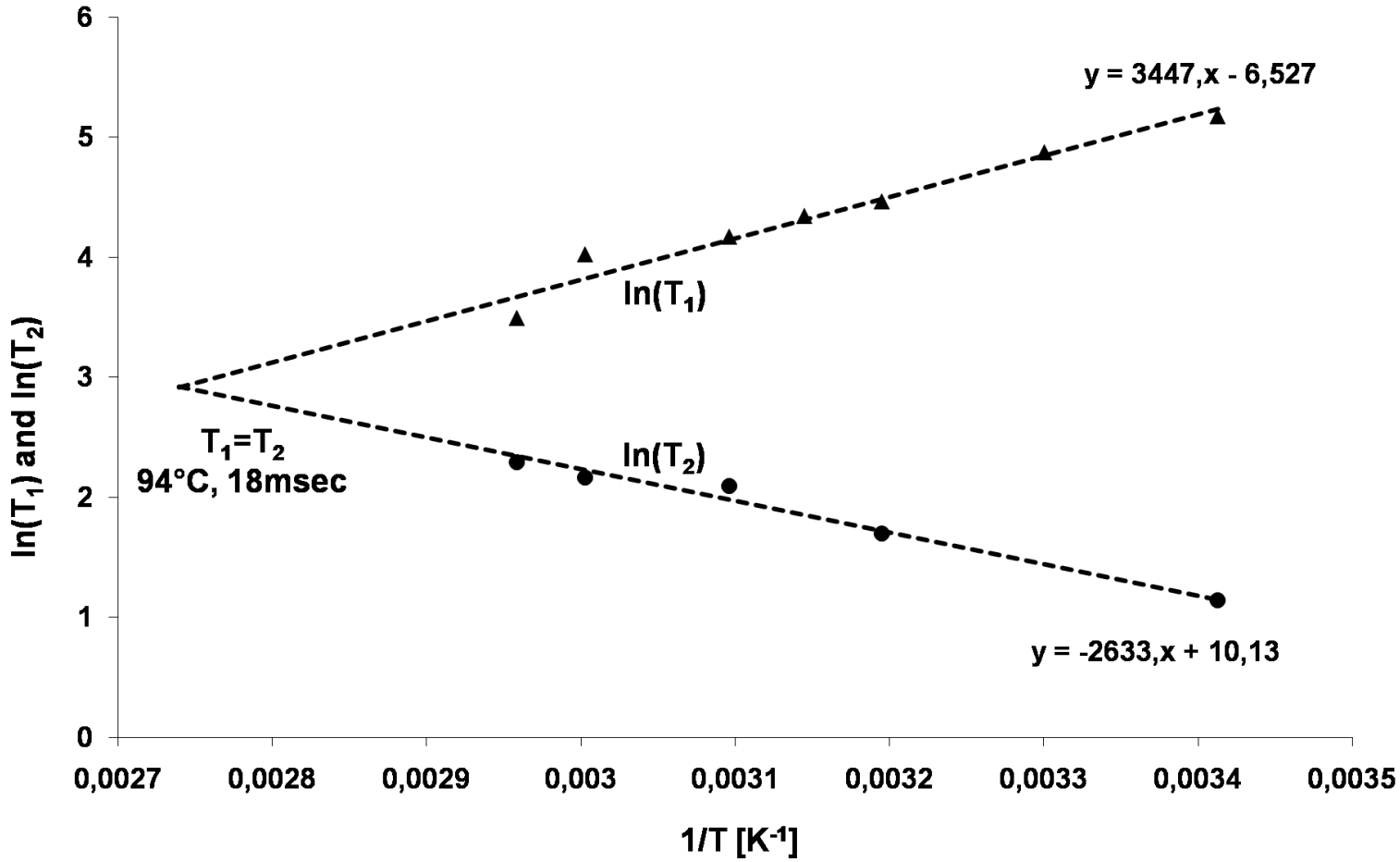

Figure S5:
Determination of $T_{1(min)}$ for $[RuH_2(\eta^2\text{-}H_2)(m\text{tppms})_3]$ (**13**).

[Ru] = 0.042M; [*m*tppms] = 0.17M; 0.6mL 0.2M phosphate buffer pH=10.0/10% CD_3OD; $P(H_2)$>5bar

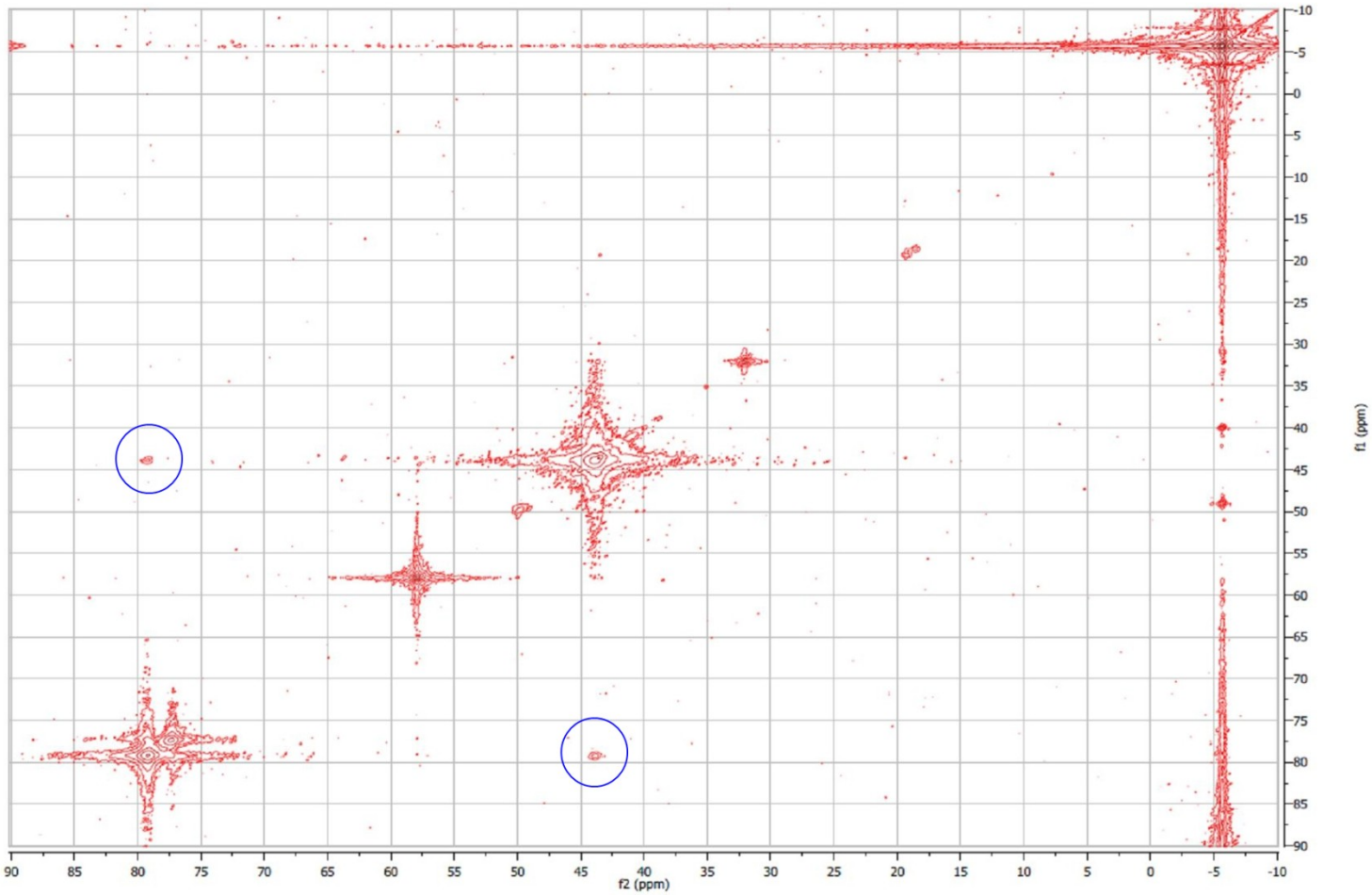

Figure S6:
^{31}P-^{31}P COSY spectrum for *trans*-[$RuH_2(HCOO)$(*m*tppms)$_3$)]$^-$ (**14**).

[Ru] = 0.042 M, [*m*tppms] = 0.17 M, [HCOONa] = 0.84 M; 0.6mL H_2O/D_2O in capillary

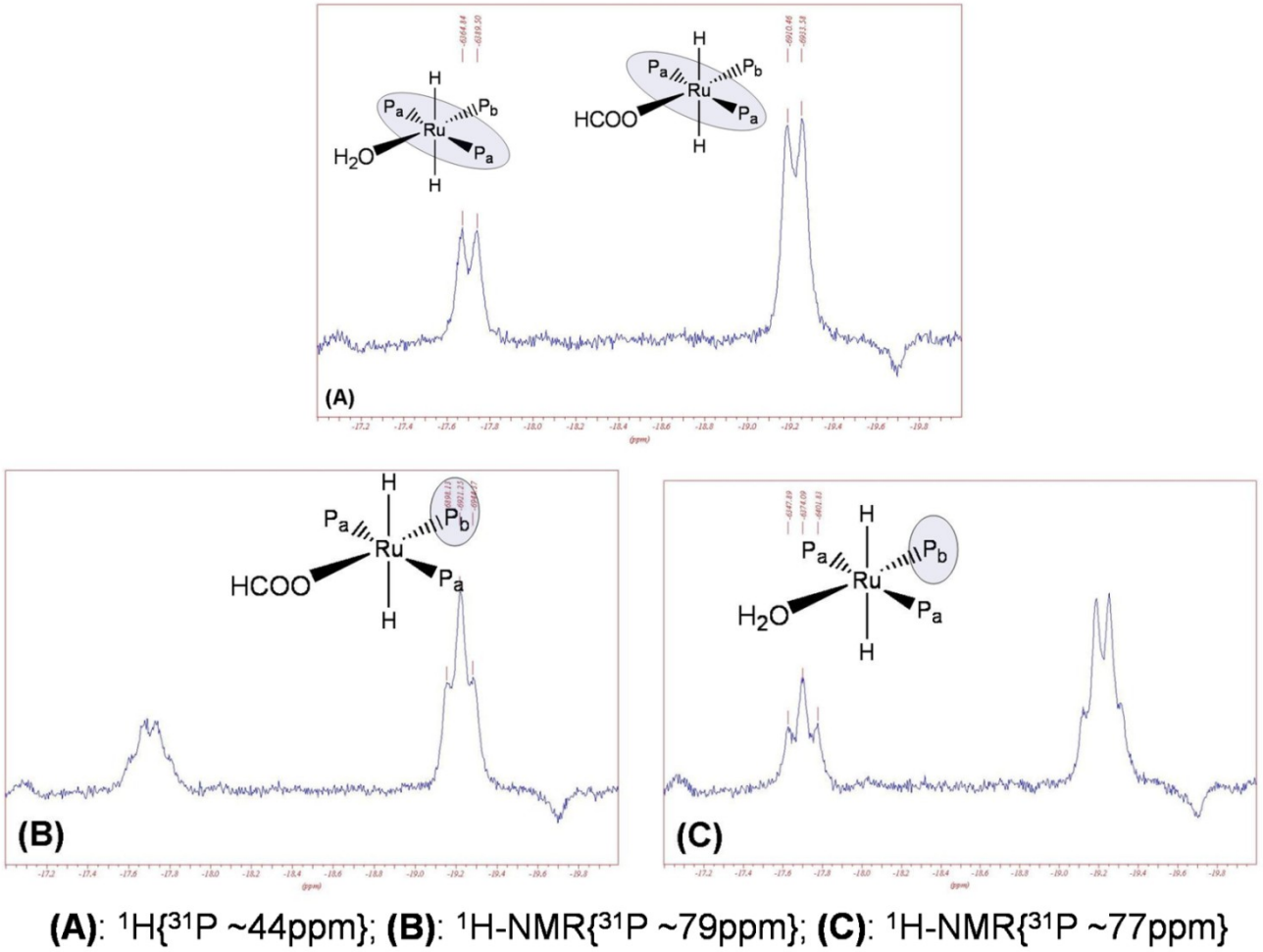

Figure S7:
Distinguishing *trans*-$[RuH_2(HCOO)(mtppms)_3)]^-$ (**14**) and *trans*-$[RuH_2(H_2O)(mtppms)_3]$ (**15**) by selective phosphorus decoupling experiments

$^1H\{P\}$-NMR [Ru] = 0.042 M, [*m*tppms] = 0.17 M, [HCOONa] = 0.84 M; 0,6mL H_2O/D_2O in capillary