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Figure S1. Comparison of the methyl regions in the ¹H NMR spectra of 13, 14 and the decomposition spectrum of 13 in CDCl₃ to identify isomer 13x



[Ru{BH(mt)₂}(CO)(PPh₃)₂] (5)

¹H NMR Spectrum of Complex 5







${}^{31}\text{P}\{{}^{1}\text{H}\}$ NMR Spectrum of Complex 5



¹¹B{¹H} NMR Spectrum of Complex 5

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[Ru{BH(mt)₂}(CO)₂(PPh₃)] (12)

¹H NMR Spectrum of Complex 12





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Pulse Width 10.0000 Acquisition Time 1.6384 Acquisition Date 2018-01-29T15:05:35 Spectrometer 400.13 Frequency	elaxation Delay	1.0000	
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Acquisition Date 2018-01-29T15:05:35 Spectrometer 400.13 Frequency 5 Spectral Width 2000.0 Lowest Frequency -12038.4 Nucleus 1H Acquired Size 32768 Spectral Size 65536	cquisition Time	1.6384	
Spectrometer 400.13 Frequency 5 Spectral Width 2000.0 Lowest Frequency -12038.4 Nucleus 1H Acquired Size 32768 Spectral Size 65536	cquisition Date	2018-01-29T15:05:35	
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Nucleus 1H Acquired Size 32768 Spectral Size 65536	owest Frequency	-12038.4	
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	pectral Size	65536	
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B NMR Sp	ectrum of Con		20 f1 (ppm)	15	10	5	0
		nplex 12					
Parameter	Value		6				
Data File Name ((E) f	C:/ Users/ Kathy/ Documents/ PhD Thesis/ Chapter Ru-B/ Raw Fids Boratrane/ KMAc177_char_CDCl3/ 12, fid	,	Ž—				
Oriain E	Bruker BioSpin GmbH						
Owner a	av400bb						
Solvent (CDCl3						
Temperature 3	300.0						
Pulse Sequence z	zg						
Experiment 1	1D						
Number of Scans 2	200						
Receiver Gain	193						
Relaxation Delay (0.2000						
Pulse Width	10.0000						
Acquisition Time	1.2845						
Acquisition Date	2018-01-29T15:21:00						
Spectrometer 1 Frequency	128.38						
Spectral Width 2	25510.2						
Lowest - Frequency	-12754.9						
Nucleus	11B						
Acquired Size	32768		M				
Spectral Size 6	65536						

$[Ru{BH(mt)_{2}}(CO)(PMe_{2}Ph)(PPh_{3})]$ (13)

¹H NMR Spectrum of Complex 13 in CDCl₃



$^{31}\text{P}\{^1\text{H}\}$ NMR Spectrum of Complex 13 in CDCl_3

Parameter	Value		94	81						.23				
Data File Nam	e C:/ Users/ Kathy/ Documents/ PhD Thesis/ Chapter Ru-B/ Raw Fids Boratrane/ KMAc166_washed_CDCl3/ 11/ fid		∕-56.	<26.						17				
Origin	Bruker BioSpin GmbH													
Owner	av400bb													
Solvent	CDCl3													
Temperature	300.0													
Pulse Sequenc	e zgpg30													
Experiment	1D													
Number of Scans	128													
Relaxation Delay	2.0000													
Acquisition Time	0.5112													
Acquisition Date	2017-11-03T16:21:32													
Spectrometer Frequency	161.98													
Nucleus	31P													
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$^{11}\text{B}\{^1\text{H}\}$ NMR Spectrum of Complex 13 in CDCl_3

Parameter	Value	7			<u>.</u>										
Data File Name	C:/ Users/ Kathy/ Documents/ PhD Thesis/ Chapter Ru-B/ Raw Fids Boratrane/ KMA-166_CDCI3/ 15/ fid)									
Origin	Bruker BioSpin GmbH														
Jwner	av400bb														
Solvent	CDCl3														
emperature	300.0														
Pulse Sequence	7000														
xperiment	1D														
Number of Scans	200														
Receiver Gain	193														
Relaxation Delay	0 2000														
Pulse Width	10,0000														
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Acquisition Date	2017-11-02T18:22:30														
Spectrometer	128.38														
requency															
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owest Frequency	-12754.9														
lucleus	11B														
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50 00	,0 00 00	.0	50	20	f1	L (ppm))	20	50	10	50	50	70	50	50

NMR spectra in CD₂Cl₂

¹H NMR Spectrum of Complex 13



[Ru{BH(mt)₂}(CO)(PMe₂Ph)₂] (14)

¹H NMR Spectrum of Complex 14



207.73 207.71 207.64 207.62	165.39 165.27 165.06 164.93	$\begin{array}{c} 143.31\\ 123.24\\ 123.34\\ 123.36\\ 122.56\\ 122.59\\ 122.56\\ 127.55\\ 127.56\\ 127.55\\ 127.56\\ 127.56\\ 127.28\\ 127.28\\ 122.28\\ 122.28\\ 120.67\\ 122.61\\ 120.65\\$	34.12 34.07	19.44 19.35 19.45 18.67 18.65 18.65 18.65 18.49 16.30 16.30 16.30
			Ŷ	No. 11



Expansion of ¹³C{¹H} NMR Spectrum of Complex 14





130	80	40	0	-40 f1 (ppm)	-90	-140	-200
P NMR S	pectrum of	Complex 14	1				
Parameter Data File Name	Value C:/ Users/ Kathy/ Documents/ PhD Thesis/ Chapter Ru-B/ Raw Fids Boratrane/ KMAc178_CDCl3/ 2/ fid		-14.51	I0.41			
Origin Owner Solvent Temperature Pulse Sequence Experiment Number of Scans Relaxation Delay Acquisition Time Acquisition Date Spectrometer Frequency Nucleus	Bruker BioSpin GmbH hill CDCl3 298.0 298.0 298.0 2030 1D 128 2.0000 0.2884 2018-02-08T16:4 7:31 283.45 31P						
				· 			
	·						
130	80	40	0	-40 f1 (ppm)	-90	-140	-200

¹¹B NMR Spectrum of Complex 14

Parameter Data File Name	Value C:/ Users/ Kathy/ Documents/ PhD TI Chapter Ru-B/ Raw Boratrane/ KMAc178_boron_CI 12/ fid	hesis/ Fids DCl3/				-5.00									
Origin	Bruker BioSpin Gmb	ын													
Owner	av400bb														
Solvent	CDCI3														
Pulso Soguence	300.0														
Fuise Sequence	29 1D														
Number of	200														
Scans															
Relaxation Delay	0.2000														
Acquisition Time	1.2845														
Acquisition Date	2018-02-09T09:10:	29													
Spectrometer	128.38														
Nucleus	11B														
Mucicus	110														
90 80) 70 60	50	40	30	20	10 0	-10	-20	-30	-40	-50	-60	-70	-80	-90

[Ru{BH(mt)₂}(CO){P(OMe)₃}₂] (15)

¹H NMR Spectrum of Complex 15



${}^{31}\text{P}{}^{1}\text{H}{}$ NMR Spectrum of Complex 15





[Ru{BH(mt)₂}(CO)(Z-Ph₂PCH=CHPPh₂)] (16)

¹H NMR Spectrum of Complex 16





${}^{\rm 31}{\rm P}\{{}^{\rm 1}{\rm H}\}$ NMR Spectrum of Complex 16



Parameter	Value	0.0		
Data File	C:/ Users/ Kathy/	57		
Name	Documents/ 1PhD Thesis/			
	Chapter Ru-b/ Raw Flus			
	KMAc156 recryst CDCl3/			
	12/ fid			
Origin	Bruker BioSpin GmbH			
Owner	av400bb			
Solvent	CDCl3			
Temperature	300.0			
Pulse	zgpg			
Sequence				
Experiment	1D			
Number of	200			
Scans				
Relaxation	0.2000			
Delay	1 2945			
Time	1.2045			
Acquisition	2018-07-06T18:13:22			
Date				
Spectrometer	128.38	1		
Frequency		ΛΙ		
Nucleus	11B			
		/ \		

90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 f1 (ppm)