Phosphino–Hydrazones as Suitable Ligands in the Asymmetric Suzuki–Miyaura Cross–Coupling

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Supporting Information

¹ H and ¹³ C–NMR spectra:	S2–S29
HPLC Chromatograms:	S30-S40

¹H NMR (CDCl₃, 400 MHz) of **15e**:



¹³C NMR (CDCl₃, 100 MHz) of **15e**:



¹H NMR (CDCl₃, 400 MHz) of **15f**:



¹³C NMR (CDCl₃, 100 MHz) of **15f**:



¹H NMR (CDCl₃, 500 MHz) of **16e**:



¹³C NMR (CDCl₃, 125 MHz) of **16e**:



¹H NMR (CDCl₃, 500 MHz) of **16g**:



¹³C NMR (CDCl₃, 125 MHz) of **16g**:





¹³C NMR (CDCl₃, 125 MHz) of **2a**:





¹H NMR (CDCl₃, 500 MHz) of **2b**:



¹H NMR (CDCl₃, 300 MHz) of **2c**:



¹³C NMR (CDCl₃, 100 MHz) of **2c**:



¹H NMR (CDCl₃, 400 MHz) of **2d**:



¹³C NMR (CDCl₃, 100 MHz) of **2d**



¹H NMR (CDCl₃, 400 MHz) of **2e**:



¹³C NMR (CDCl₃, 100 MHz) of **2e**



¹H NMR (CDCl₃, 400 MHz) of **2f**:



 13 C NMR (CDCl₃, 100 MHz) of **2f**



¹H NMR (CDCl₃, 400 MHz) of **2g**:



¹³C NMR (CDCl₃, 100 MHz) of **2g**



¹H NMR (CDCl₃, 500 MHz) of **2h**:



¹³C NMR (CDCl₃, 125 MHz) of **2h**:



¹H NMR (CDCl₃, 500 MHz) of **18**:



¹³C NMR (CDCl₃, 125 MHz) of **18**:







¹³C-NMR (CDCl₃, 125 MHz) of **2i**:



¹H NMR (CD₂Cl₂, 500 MHz) of **10a**:



¹³C NMR (CD₂Cl₂, 125 MHz) of **10a**:



¹H NMR (CDCl₃, 500 MHz) of **10b**:



¹H NMR (CDCl₃, 500 MHz) of **10c**:



¹³C NMR (CDCl₃, 75 MHz) of **10c**:



¹H NMR (CDCl₃, 400 MHz) of **27a**:





³¹P NMR (CDCl₃, 161.7 MHz) of **27a**:

¹H NMR (CDCl₃, 500 MHz) of **13c**:



¹³C NMR (CDCl₃, 125 MHz) of **13c**



¹H NMR (CDCl₃, 400 MHz) of **13d**:



¹³C NMR (CDCl₃, 100 MHz) of **13d**



¹H NMR (CDCl₃, 300 MHz) of **23a**:



¹³C NMR (CDCl₃, 125 MHz) of **23a:**



¹H NMR (CDCl₃, 300 MHz) of **23b**:



¹³C NMR (CDCl₃, 125 MHz) of **23b**



¹H NMR (CDCl₃, 500 MHz) of **23c**:



¹³C NMR (CDCl₃, 125MHz) of **23c**:



¹H NMR (CDCl₃, 500 MHz) of **23d**:



¹³C NMR (CDCl₃, 125MHz) of **23d**:



¹H NMR (CDCl₃, 300 MHz) of **24**:



¹³C NMR (CDCl₃, 125MHz) of **24**





¹³C NMR (CDCl₃, 125 MHz) of **25a**



1 H NMR (CDCl₃, 400 MHz) of **25b**



¹³C NMR (CDCl₃, 100 MHz) of **25a**



HPLC CHROMATOGRAMS:

HPLC data for **13a**: Daicel Chiralpak OJ column (2-propanol/hexane 5:95, flow rate 1 mL/min)



Racemic:



Enantioenriched:



Processed	Channel	: PDA 2	23.8 ni	m

	Processed Channel	Retention Time (min)	Area	% Area	Height
1	PDA 223.8 nm	11.402	31220963	90.11	954239
2	PDA 223.8 nm	20.874	3427041	9.89	51156

HPLC data for 13b: Daicel Chiralpak OJ column (2-propanol/hexane 5:95, 1 mL/min)



Racemic:



Enantioenriched:



	Processed Channel	Retention Time (min)	Area	% Area	Height
1	PDA 229.8 nm	6.660	15067635	74.29	890296
2	PDA 229.8 nm	10.536	5214348	25.71	164182

HPLC data for 13c: Daicel Chiralpak OJ column (2-propanol/hexane 10:90, 1 mL/min)



Racemic:



Enantioenriched:



Processed Channel: PDA 222.6 nm

	Processed Channel	Retention Time (min)	Area	% Area	Height
1	PDA 222.6 nm	9.872	16173271	77.01	1371944
2	PDA 222.6 nm	10.570	4827685	22.99	397795

HPLC data for 13d: Daicel Chiralpak OJ column (2-propanol/hexane 5:95, mL/min)



Racemic:



Enantioenriched:



Processed	Channel:	PDA 223.8	nm
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	Processed Channel	Retention Time (min)	Area	% Area	Height
1	PDA 223.8 nm	11.165	26417520	79.19	702074
2	PDA 223.8 nm	14.076	6940210	20.81	150673

HPLC data for 23a: Daicel Chiralpak IC column (2-propanol/hexane 1:99, 1 mL/min)



Processed Channel: PDA 226.1 nm

	Processed Channel	Retention Time (min)	Area	% Area	Height
1	PDA 226.1 nm	7.838	4358554	90.66	466426
2	PDA 226.1 nm	9.289	449054	9.34	42294

Enantioenriched:

HPLC data for 23b: Daicel Chiralpak IC column (2-propanol/hexane 1:99, 1 mL/min)

11.161 830





Processed Channel: PDA 220.4 nm

	Processed Channel	Retention Time (min)	Area	% Area	Height
1	PDA 220.4 nm	11.135	19657383	89.40	1557386
2	PDA 220.4 nm	11.802	2329713	10.60	170687

HPLC data for 23c: Daicel Chiralpak IC column (2-propanol/hexane 1:99, 1 mL/min)



Racemic:



Enantioenriched:



Processed Channel: PDA 230.8 nm

		Processed Channel	Retention Time (min)	Area	% Area	Height
-	1	PDA 230.8 nm	9.676	24381373	91.06	2122771
2	2	PDA 230.8 nm	10.201	2393622	8.94	217758

HPLC data for 23d: Daicel Chiralcel OJ column (2-propanol/hexane 1:99, 1 mL/min)



Racemic:



Enantioenriched:



HPLC data for 24: Daicel Chiralpak IB, column (2-propanol/hexane 0.1:99.9, 1 mL/min)



Racemic:





	Processed Channel	Retention Time (min)	Area	% Area	Height
1	PDA 217.2 nm	9.755	662384	8.91	32665
2	PDA 217.2 nm	10.343	6773206	91.09	208656

HPLC data for 25a: Daicel Chiralpak IC column (2-propanol/hexane 10:90, 1 mL/min)



Processed Channel: PDA 227.3 nm

	Processed Channel	Retention Time (min)	Area	% Area	Height
1	PDA 227.3 nm	14.134	6488452	11.14	348089
2	PDA 227.3 nm	25.456	51751545	88.86	1515048

HPLC data for **25b**: Daicel Chiralpak AD-H column (2-propanol/hexane 5:95, 1 mL/min)



Racemic:



Enantioenriched:



Processed Channel: PDA 227.0 nm

	Processed Channel	Retention Time (min)	Area	% Area	Height
1	PDA 227.0 nm	8.641	17056172	86.19	1515817
2	PDA 227.0 nm	10.405	2732264	13.81	205162