$^1$H NMR of 1 in CD$_2$Cl$_2$ at 298 K. Residual hexane is marked \(*\).
$^{13}$C NMR of 1 in CD$_2$Cl$_2$ at 298 K.
$^1$H NMR of $1^f$ in CD$_2$Cl$_2$ at 298 K. Residual hexane is marked *.
$^{13}$C DEPT-135 NMR of $1^F$ in CD$_2$Cl$_2$ at 298 K.
13C NMR of $1^F$ in CD$_2$Cl$_2$ at 298 K.
$^1J_{CH} = 4.1$ Hz

$^1J_{CH} = 142.5$ Hz

$^3J_{CH} = 4.1$ Hz

$^1H$ NMR of $1^*$ in CD$_2$Cl$_2$ at 298 K.
1H NMR of diastereomeric mixture 2M, 2m in THF-d$_8$ at 193 K. Peaks marked * are non-identified impurities.
13C NMR of 2M, 2m in THF-d8 at 193 K with carbonyl zone enlargement (195-200 ppm). Residual toluene is marked *.
$^{13}$C NMR (THF-$d_8$, 193 K) enlargement of the region of the heterocyclic signals of 2M, 2m. Residual toluene is marked *.
$^{13}$C NMR (THF-$d_8$, 193 K) enlargement of the alkyl sulfide signals of 2M, 2m.
DEPT-135 NMR of 2M, 2m in THF-d$_8$ at 193 K and enlargement of the alkyl sulfide signals.
2D HMBC NMR of 2M, 2m in THF-d8 at 193 K. 2J and 3J couplings for a methylene hydrogen of the major diasteromer are marked with a square. The structure shown is not necessarily the major diasteromer.
$^1$H NMR of diasteromeric mixture 2M*, 2m* in THF-d$_8$ at 193 K.
$^1$H NMR (THF-d$_8$, 193 K) enlargement showing the alkyl sulfide signals of 2M*, 2m* and their couplings.
$^{13}$C NMR of 2M*, 2m* in THF-d$_8$ at 193 K. Residual toluene is marked *.
Enlargement of $^{13}$C NMR of 2M*, 2m* in THF-d$_8$ at 193 K (200-70 ppm) including enlargement of the bipy C7 signals. Residual toluene is marked *.
DEPT-135 NMR of $2M^*$, $2m^*$ in THF-$_d_8$ at 193 K with an enlargement of the region of the heterocyclic signals (155-70 ppm). Residual toluene is marked *.
$^{13}$C NMR and DEPT-135 NMR of $2M^*$, $2m^*$ in THF-d$_8$ at 193 K. Enlargement showing the alkyl sulfide signals.
$^1$H NMR of 3M, 3m and 4 in THF-d$_8$ at 298 K.
$^1$H-$^{13}$C HSQC NMR of 3M, 3m and 4 in THF-d$_8$ at 298 K.
$^{1}H-^{13}C$ HMBC NMR of 3M, 3m and 4 in THF-d$_8$ at 298 K.
$^1$H NMR of crude 4 in THF-d$_8$ at 298 K.
$^1$H NMR of 4 in toluene-$d_8$ at 298 K.
$^1$H-$^{13}$C HSQC NMR of 4 in toluene-$d_8$ at 298 K.
$^1$H-$^{13}$C HMBC NMR of 4 in toluene-d$_8$ at 298 K.
\(^{13}\text{C}\) NMR of 4 in toluene-d\(_8\) at 298 K.
$^1$H NMR of 5 in CD$_2$Cl$_2$ at 298 K.
$^{13}$C NMR of 5 in CD$_2$Cl$_2$ at 193 K with carbonyl zone enlargement (195-200 ppm). $^{2}J_{C,P}$ cis and trans are showed. The signal marked * consists of two signals.
DEPT-135 NMR of 5 in CD$_2$Cl$_2$ at 193 K. The signal marked * consists of two signals.
$^{31}$P NMR of 5 in CD$_2$Cl$_2$ at 298 K.
2D HMBC NMR of 5 in CD$_2$Cl$_2$ at 193 K. $^2J$ and $^3J$ couplings for methylene hydrogens are marked with a square.
$^1$H NMR of 5* in CD$_2$Cl$_2$ at 298 K with an enlargement for the methylene hydrogens showing their couplings. Note that the intensity of the methyl signal at 1.7 ppm is distorted by the THF signal included behind it.

$^1J_{CH} = 138.5$ Hz

$^2J_{HH} = 13.1$ Hz

$^3J_{CH} = 4.3$ Hz

$^1J_{CH} = 80.4$ Hz

S-CH$_3$

S-CH$_2$

THF

PMe$_3$
$^{13}$C NMR of 5* in CD$_2$Cl$_2$ at 193 K with heterocyclic and carbonyl signals enlargement (200-70 ppm). $^{2}J_{CP}$ cis and trans are showed for carbonyls and $^{1}J_{CC}$ for bipy C7.
DEPT-135 NMR of $5^*$ in CD$_2$Cl$_2$ at 193 K with an enlargement of heterocyclic CH signals.
$^{31}$P NMR of $5^*$ in $\text{CD}_2\text{Cl}_2$ at 298 K.
$^1$H NMR of 6 in $\text{CD}_2\text{Cl}_2$ at 298 K with an enlargement of dmmp signals. Signals marked * correspond to free dmmp.
$^{13}$C NMR of 6 in CD$_2$Cl$_2$ at 193 K. Residual toluene is marked * and free dmpm +.
DEPT-135 of 6 in CD$_2$Cl$_2$ at 193 K. Residual toluene is marked * and free dmpm +.
$^{31}$P NMR of 6 in CD$_2$Cl$_2$ at 298 K. Free dmpm is marked +.
2D HMBC NMR of 6 in CD$_2$Cl$_2$ at 298 K. $^2J$ and $^3J$ couplings for methylene hydrogens are marked with a square.
\(^1\text{H NMR of 7 in CD}_2\text{Cl}_2\) at 298 K.
$^{1}H-^{1}H$ COSY NMR of 7 in CD$_2$Cl$_2$ at 298 K.
$^{13}$C DEPT-135 NMR of 7 in CD$_2$Cl$_2$ at 298 K.
$^1$H-$^{13}$C HSQC NMR of 7 in CD$_2$Cl$_2$ at 298 K.
$^{1}H\text{-}^{13}C$ HMBC NMR of 7 in CD$_2$Cl$_2$ at 298 K.
$^{13}$C NMR of 7 in CD$_2$Cl$_2$ at 298 K. Signals of [Re(phen)(CO)$_3$OTf] from sulfide substitution by OTf in 7 while acquisition are marked *.
$^1$H NMR of 8 and 9 in toluene-$d_8$ at 298 K.
$^1$H-$^1$H COSY NMR of 8 and 9 in toluene-$d_8$ at 298 K.
$^{13}$C DEPT-135 NMR of 8 and 9 in toluene-d$_8$ at 298 K.
$^{1}$H-$^{13}$C HSQC NMR of 8 and 9 in toluene-$d_8$ at 298 K.
$^1$H-$^{13}$C HMBC NMR of 8 and 9 in toluene-$d_8$ at 298 K.
$^{13}$C NMR of 8 and 9 in toluene-$d_8$ at 298 K.
$^1$H NMR of 9 in toluene-d$_8$ at 298 K.
$^1$H-$^1$H COSY NMR of 9 in toluene-d$_8$ at 298 K.
$^{13}$C NMR of 9 in toluene-$d_8$ at 298 K.
$^1$H NMR of 10 in CD$_2$Cl$_2$ at 298 K. Signal of retained hexane is marked * (1.4 ppm multiplet is under CH$_3$ iPr signal).
$^{13}$C NMR of 10 in CD$_2$Cl$_2$ at 298 K.
DEPT-135 of 10 in CD$_2$Cl$_2$ at 298 K.
$^1$H NMR of 11 in CD$_2$Cl$_2$ at 298 K. Signals of retained hexane are marked *.
$^1$H NMR of 11 in toluene-$d_8$ at 298 K. Signals of retained hexane (1.4 ppm multiplet is under CH$_3$ iPr signal) are marked *, and of retained CH$_2$Cl$_2$ +. Alkyl sulfide signals are obscured by the CH$_3$ iPr signals.
2D COSY NMR of 11 in CD$_2$Cl$_2$ at 298 K.
$^{13}$C NMR of 11 in CD$_2$Cl$_2$ at 298 K.
DEPT-135 NMR of 11 in CD$_2$Cl$_2$ at 298 K.
DEPT-90 NMR of 11 in CD$_2$Cl$_2$ at 298 K used for the distinction between CH and CH$_3$ in the isopropyl groups.
2D HMBC NMR of 11 in CD$_2$Cl$_2$ at 298 K. $^2J$ and $^3J$ couplings for one methylene hydrogen are marked with a square.
H NMR of 12 in CD$_2$Cl$_2$ at 298 K.

Ar = p-methylphenyl
DEPT-135 NMR of 12 in CD$_2$Cl$_2$ at 298 K.

$Ar = p$-methylphenyl
2D COSY NMR of 12 in CD$_2$Cl$_2$ at 298 K.

Ar = p-methylphenyl
$^1$H-$^{13}$C HSQC NMR of 12 in CD$_2$Cl$_2$ at 298 K.
$^{1}{H}\text{-}^{13}C$ HMBC NMR of $^{12}$ in CD$_2$Cl$_2$ at 298 K.

$Ar = p$-methylphenyl
$^{13}$C NMR of 12 in CD$_2$Cl$_2$ at 298 K.

$\text{Ar} = p$-methylphenyl
$^1$H NMR of 13 in toluene-$d_8$ at 298 K.

Ar = $p$-methylphenyl
$^{13}$C NMR of 13 in toluene-$d_8$ at 298 K.

Ar = $p$-methylphenyl
\(^1\text{H NMR of compound 14 in CD}_2\text{Cl}_2\) at 298 K.
2D COSY NMR for compound 1 in CD$_2$Cl$_2$ at 298 K.
The $^{31}$P NMR spectrum of compound 14 in CD$_2$Cl$_2$ at 298 K.
$^{13}$C NMR for compound 14 in CD$_2$Cl$_2$ at 298 K.
$^1$H NMR for compound 15 in CD$_2$Cl$_2$ at 298 K.
$^{31}$P NMR for compound 15 in CD$_2$Cl$_2$ at 298 K.
$^{13}$C NMR for compound 15 in CD$_2$Cl$_2$ at 298 K.
$^{1}$H NMR for compound 17 in CD$_2$Cl$_2$ at 298 K.
$^{31}$P NMR for compound 17 in CD$_2$Cl$_2$ at 298 K.
$^{13}$C NMR for compound 17 in CD$_2$Cl$_2$ at 298 K.
$^1$H NMR for compound 16 in THF-$d_8$ at 298 K.
H NMR for compound 16 in THF-d$_8$ at 253 K.
2D COSY NMR for compound 16 in THF-d$_8$ at 298 K.
2D HSQC NMR for compound 16 in THF-d$_8$ at 298 K.
2D HSQC NMR for compound 16 in THF-$d_8$ at 253 K.
2D HMBC NMR for compound 16 in THF-d$_8$ at 253 K.
$^{13}$C DEPT-135 NMR for compound 16 in THF-$d_8$ at 253 K.
$^{13}$C NMR for compound 16 in THF-$d_8$ at 193 K.
$^{31}$P NMR for compound 16 in THF-$d_8$ at 253 K.
$^{1}H$ NMR of 18 and 19 in CD$_2$Cl$_2$ at 298 K.
$^1$H-$^1$H COSY NMR of 18 and 19 in CD$_2$Cl$_2$ at 298 K.
$^{31}$P NMR of 18 and 19 in CD$_2$Cl$_2$ at 298 K.
$^{13}$C DEPT-135 NMR of 18 and 19 in CD$_2$Cl$_2$ at 298 K.
$^{1}H-^{13}C$ HSQC NMR of 18 and 19 in CD$_2$Cl$_2$ at 298 K.
$^{1}H-{^{13}}C$ HMBC NMR of 18 and 19 in CD$_2$Cl$_2$ at 298 K.
$^{13}$C NMR of 18 and 19 in CD$_2$Cl$_2$ at 298 K.
$^1$H-31P HMBC NMR of 18 and 19 in CD$_2$Cl$_2$ at 298 K.
$^1$H NMR of 19 in CD$_2$Cl$_2$ at 298 K.
$^{1}\text{H} - ^{1}\text{H}$ COSY NMR of 19 in CD$_2$Cl$_2$ at 298 K.
$^{31}$P NMR of 19 in CD$_2$Cl$_2$ at 298 K.
$^1$H NMR of 20 in CD$_2$Cl$_2$ at 298 K.
$^1$H-$^1$H COSY NMR of 20 in CD$_2$Cl$_2$ at 298 K.
$^{13}$C DEPT-135 NMR of 20 in CD$_2$Cl$_2$ at 298 K.
$^{1}H-^{13}C$ HSQC NMR of 20 in CD$_2$Cl$_2$ at 298 K.
$^{1}H-^{13}C$ HMBC NMR of 20 in CD$_2$Cl$_2$ at 298 K.
$^{13}$C NMR of 20 in CD$_2$Cl$_2$ at 298 K.
$^{31}$P NMR of 20 in CD$_2$Cl$_2$ at 298 K.
$^{1}$H NMR of 21 in THF-$d_8$ at 253 K.
$^1$H-$^1$H COSY NMR of 21 in THF-d$_8$ at 253 K.
$^{31}$P NMR of 21 in THF-d$_8$ at 253 K.
$^1$H-$^{13}$C HSQC NMR of 21 in THF-d$_8$ at 253 K.
$^{13}$C DEPT-135 NMR of 21 in THF-d$_8$ at 253 K.
$^{31}\text{P}$ NMR of a mixture of 21 and 16 in THF-$d_8$ at 273 K.
$^1$H NMR of 16 in THF-d$_8$ at 273 K from NMR monitoring of the transformation of 21 in 16.
$^{31}$P NMR of 16 in THF-$d_8$ at 273 K from NMR monitoring of the transformation of 21 in 16.
$^1$H-$^1$H COSY NMR of 16 in THF-$d_8$ at 273 K from NMR monitoring of the transformation of 21 in 16.
$^1$H NMR for compound 22 in CD$_2$Cl$_2$ at 298 K.
DEPT-90 NMR for compound 22 in CD$_2$Cl$_2$ at 298 K.

Ar = 2,6- diisopropylphenyl
$^{13}$C NMR for compound 22 in CD$_2$Cl$_2$ at 298 K.
$^{31}$P NMR for compound 22 in CD$_2$Cl$_2$ at 298 K.

Ar = 2,6-diisopropylphenyl
$^1$H NMR for compound 23 in CD$_2$Cl$_2$ at 298 K.
2D COSY NMR for compound 23 in CD$_2$Cl$_2$ at 298 K.
DEPT-90 NMR for compound 23 in CD$_2$Cl$_2$ at 298 K.
DEPT-135 NMR for compound 23 in CD$_2$Cl$_2$ at 298 K.
$^{13}$C NMR for compound 23 in CD$_2$Cl$_2$ at 298 K.
2D HMBC NMR for compound 23 in CD₂Cl₂ at 298 K.
$^{31}$P NMR for compound 23 in CD$_2$Cl$_2$ at 298 K.
$^1$H NMR for compound 24 in CD$_2$Cl$_2$ at 298 K.
2D COSY NMR for compound 24 in CD$_2$Cl$_2$ at 298 K.
DEPT-135 NMR for compound 24 in CD$_2$Cl$_2$ at 298 K.
DEPT-90 NMR for compound 24 in CD$_2$Cl$_2$ at 298 K.
HSQC NMR for compound 24 in CD$_2$Cl$_2$ at 298 K.
$^{13}$C NMR for compound 24 in CD$_2$Cl$_2$ at 298 K.
$^{31}$P NMR for compound 24 in CD$_2$Cl$_2$ at 298 K.
$^1$H NMR for compound $24^F$ in CD$_2$Cl$_2$ at 298 K.
2D COSY NMR for compound $24^F$ in CD$_2$Cl$_2$ at 298 K.
$^{13}$C NMR for compound $24^F$ in CD$_2$Cl$_2$ at 298 K.
$^{31}\text{P}$ NMR for compound $24^\text{F}$ in CD$_2$Cl$_2$ at 298 K.
$^1$H NMR for compound 26M, 26m in CD$_2$Cl$_2$ at 298 K.
2D COSY NMR for compound 26M, 26m in CD$_2$Cl$_2$ at 298 K.
DEPT-135 NMR for compound 26M, 26m in CD$_2$Cl$_2$ at 298 K.
DEPT-90 NMR for compound **26M, 26m** in CD$_2$Cl$_2$ at 298 K.
$^{13}$C NMR for compound 26M, 26m in CD$_2$Cl$_2$ at 298 K.
$^{31}$P NMR for compound 26M, 26m in CD$_2$Cl$_2$ at 298 K.
$^1$H NMR for compound 25 in CD$_2$Cl$_2$ at 298 K.
2D COSY NMR for compound 25 in CD$_2$Cl$_2$ at 298 K.
DEPT-90 NMR for compound 25 in CD$_2$Cl$_2$ at 298 K.
$^{13}$C NMR for compound 25 in CD$_2$Cl$_2$ at 298 K.
2D HSQC NMR for compound 25 in CD$_2$Cl$_2$ at 298 K.
$^{31}$P NMR for compound 25 in CD$_2$Cl$_2$ at 298 K.
$^1$H NMR for compound 25 in CD$_2$Cl$_2$ at 193 K.
2D COSY NMR for compound 25 in CD$_2$Cl$_2$ at 193 K.
\(^{13}\text{C}\) NMR for compound \textbf{25} in CD\(_2\)Cl\(_2\) at 193 K.
DEPT-90 NMR for compound 25 in CD$_2$Cl$_2$ at 193 K.
2D HSQC NMR for compound 25 in CD$_2$Cl$_2$ at 193 K.
$^{31}$P NMR for compound 25 in CD$_2$Cl$_2$ at 193 K.
1H NMR for compound 25 in toluene-d$_8$ at 298 K.
$^1$H NMR for compound 25 in tol-d$_8$ at 368 K.
$^1$H NMR for compound 27 in CD$_2$Cl$_2$ at 298 K.
2D COSY NMR for compound 27 in CD$_2$Cl$_2$ at 298 K.
DEPT-90 NMR for compound 27 in CD$_2$Cl$_2$ at 298 K.
DEPT-135 NMR for compound 27 in CD$_2$Cl$_2$ at 298 K.
$^{13}$C NMR for compound 27 in CD$_2$Cl$_2$ at 298 K.
2D HSQC NMR for compound 27 in CD$_2$Cl$_2$ at 298 K.
2D HMBC NMR for compound 27 in CD$_2$Cl$_2$ at 298 K.
$^{31}$P NMR for compound 27 in CD$_2$Cl$_2$ at 298 K.
$^1\text{H}$ NMR spectrum of 28 in toluene-$d_8$ at 298 K
COSY NMR spectrum of 28 in toluene-d$_8$ at 298 K
DEPT-135 NMR spectrum of 28 in toluene-d$_8$ at 298 K
$^{1}H-^{13}C$ HSQC NMR spectrum of 28 in toluene-d$_8$ at 298 K
$^{1}\text{H}-^{13}\text{C}$ HMBC NMR spectrum of 28 in toluene-$d_8$ at 298 K
2D NOESY NMR spectrum of 28 in toluene-d$_8$ at 298 K
$^1$H-$^{15}$N HMBC NMR spectrum of 28 in toluene-$d_8$ at 298 K
$^{13}$C NMR spectrum of 28 in toluene-$d_8$ at 298 K
$^1$H NMR spectrum of 29 in toluene-d$_8$ at 298 K
$^{13}$C DEPT-135 NMR spectrum of **29** in toluene-$d_8$ at 298 K
$^1\text{H}^{13}\text{C}$ HSQC NMR spectrum of 29 in toluene-d$_8$ at 298 K
$^{1}\text{H}-^{13}\text{C}$ HMBC NMR spectrum of 29 in toluene-$d_8$ at 298 K
$^{1}$H NMR spectrum of 30 in benzene-$d_6$ at 298 K
$^{1}H-^{1}H$ COSY NMR spectrum of 30 in benzene-$d_6$ at 298 K
$^1\text{H}-^1\text{H}$ NOESY NMR spectrum of 30 in benzene-$d_6$ at 298 K
$^{13}$C DEPT-135 NMR spectrum of 30 in benzene-$d_6$ at 298 K
$^1$H-$^{13}$C HSQC NMR spectrum of 30 in benzene-$d_6$ at 298 K
$^{1}H$-$^{13}C$ HMBC NMR spectrum of 30 in benzene-$d_6$ at 298 K
$^{13}$C NMR spectrum of 30 in benzene-$d_6$ at 298 K
$^1$H-$^{15}$N HMBC NMR spectrum of 30 in benzene-d$_6$ at 298 K
$^{31}$P NMR spectrum of 30 in benzene-$d_6$ at 298 K
$^{1}$H NMR spectrum of 31 in CD$_2$Cl$_2$ at 298 K
$^1$H-$^1$H COSY NMR spectrum of 31 in CD$_2$Cl$_2$ at 298 K (enlargement of bipy signals)
$^{1}H-^{13}C$ HSQC NMR spectrum of 31 in CD$_2$Cl$_2$ at 298 K.
$^{1}H-^{13}C$ HSQC NMR spectrum of 31 in $CD_{2}Cl_{2}$ at 298 K (enlargement of bipy signals)
$^1$H-$^{13}$C HMBC NMR spectrum of 31 in CD$_2$Cl$_2$ at 298 K
$^{1H-13C}$ HMBC NMR spectrum of 31 in CD$_2$Cl$_2$ at 298 K (enlargement of bipy signals)
$^{13}$C DEPT-135 NMR spectrum of 31 in CD$_2$Cl$_2$ at 298 K.
$^{13}$C NMR spectrum of \textbf{31} in CD$_2$Cl$_2$ at 298 K.
$^{31}$P NMR spectrum of 31 in CD$_2$Cl$_2$ at 298 K.
$^1$H-$^{15}$N HMBC NMR spectrum of 31 in CD$_2$Cl$_2$ at 298 K.
$^1$H NMR spectrum of 32 in CD$_2$Cl$_2$ at 298 K
$^1\text{H}^-\text{H}$ COSY NMR spectrum of 32 in CD$_2$Cl$_2$ at 298 K
$^{13}$C DEPT-135 NMR spectrum of 32 in CD$_2$Cl$_2$ at 298 K
$^1$H-$^{13}$C HSQC NMR spectrum of 32 in CD$_2$Cl$_2$ at 298 K
$^{1}H^{-13}C$ HMBC NMR spectrum of 32 in $CD_{2}Cl_{2}$ at 298 K
$^{13}$C NMR spectrum of 32 in CD$_2$Cl$_2$ at 298 K
$^{31}$P NMR spectrum of 32 in CD$_2$Cl$_2$ at 298 K
$^1$H NMR spectrum of 33M, 33m in THF-d$_8$ at 273 K
The 1H-1H COSY NMR spectrum of 33M, 33m in THF-d₈ at 273 K
$^{1}H$-$^{15}N$ HMBC NMR spectrum of 33M, 33m in THF-d$_8$ at 273 K
$^1\text{H}-^{13}\text{C}$ HSQC NMR spectrum of $33\text{M}$, $33\text{m}$ in THF-d$_8$ at 273 K
$^{1}\text{H-}^{13}\text{C}$ HMBC NMR spectrum of 33M, 33m in THF-$d_8$ at 273 K (enlargement of bipy signals)
$^{13}$C DEPT-135 NMR spectrum of 33M, 33m in THF-d$_8$ at 273 K
$^{31}$P NMR spectrum of 33M, 33m in THF-$d_8$ at 273 K
$^1$H NMR spectrum of 34 in benzene-$d_6$ at 298 K
$^1$H-$^1$H COSY NMR spectrum of 34 in benzene-d$_6$ at 298 K
$^{1}H-{^{15}}N$ HMBC NMR spectrum of 34 in benzene-$d_6$ at 298 K
$^{13}$C DEPT-135 NMR spectrum of 34 in benzene-$d_6$ at 298 K
$^{1}H$-$^{13}C$ HSQC NMR spectrum of 34 in benzene-$d_6$ at 298 K
$^1$H-$^{13}$C HMBC NMR spectrum of 34 in benzene-$d_6$ at 298 K
$^{13}$C NMR spectrum of 34 in benzene-d$_6$ at 298 K
$^{31}$P NMR spectrum of 34 in benzene-$d_6$ at 298 K
$^1\text{H NMR}$ spectrum of 35 in $\text{CD}_2\text{Cl}_2$ at 298 K
$^1H^1H$ COSY NMR spectrum of 35 in CD$_2$Cl$_2$ at 298 K
$^{13}$C DEPT-135 NMR spectrum of 35 in CD$_2$Cl$_2$ at 298 K
$^{1}H^{13}C$ HSQC NMR spectrum of 35 in $CD_2Cl_2$ at 298 K
$^{1}H$-$^{13}C$ HMBC NMR spectrum of 35 in $CD_2Cl_2$ at 298 K
$^{13}$C NMR spectrum of 35 in CD$_2$Cl$_2$ at 298 K
$^{31}$P NMR spectrum of 35 in CD$_2$Cl$_2$ at 298 K
$^{1}$H NMR spectrum of 36 in CD$_2$Cl$_2$ at 298 K
$^{31}$P NMR spectrum of 36 in CD$_2$Cl$_2$ at 298 K
2D HSQC spectrum of 36 in CD$_2$Cl$_2$ at 298 K
$^{13}$C NMR spectrum of 36 in CD$_2$Cl$_2$ at 298 K
2D $^1$H-$^{15}$N HMBC NMR spectrum of 36 in THF-d$_8$ at 298 K (enlargement of phen signals)
$^1$H NMR spectrum of 36 with 0.5 eq of Me$_4$phen in CD$_2$Cl$_2$ after 2 days at 298 K
$^{31}$P NMR spectrum of 36 with 0.5 eq of Me$_4$phen in CD$_2$Cl$_2$ after 2 days at 298 K
$^1$H NMR spectrum of [Re(Me$_4$phen)(CO)$_3$PMe$_3$]OTf (54) with 0.35 eq of phen in CD$_2$Cl$_2$ after 2 days at 298 K
$^{31}$P NMR spectrum of [Re(Me$_4$phen)(CO)$_3$PMe$_3$]OTf (54) with 0.35 eq of phen in CD$_2$Cl$_2$ after 2 days at 298 K
$^1$H NMR spectrum of 37 in THF-d$_8$ at 298 K
$^{1}H$,$^{31}P$ NMR spectrum of 37 in toluene-d$_8$ at 298 K.
$^{31}$P NMR spectrum of 37 in THF-d$_8$ at 298 K
2D COSY NMR spectrum of 37 in THF-d$_8$ at 298 K
DEPT-135 NMR spectrum of 37 in THF-d₈ at 298 K
2D HSQC NMR spectrum of 37 in THF-d$_8$ at 298 K
2D HMBC NMR spectrum of 37 in THF-d$_8$ at 298 K
2D $^1$H-$^{15}$N HMBC NMR spectrum of 37 in THF-d$_8$ at 298 K. $J_{NH} = 7$ Hz.
$^{13}$C NMR spectrum of 37 in THF-d$_8$ at 298 K
$^1$H NMR spectrum of 38 in CD$_2$Cl$_2$ at 298 K.
2D COSY NMR spectrum of 38 in CD$_2$Cl$_2$ at 298 K
$^{31}$P NMR spectrum of 38 in CD$_2$Cl$_2$ at 298 K
2D $^1$H-$^{15}$N HMBC NMR spectrum of 38 in CD$_2$Cl$_2$ at 298 K.
2D $^1$H-$^{15}$N HMBC NMR spectrum of 38 in CD$_2$Cl$_2$ at 298 K.

$^2J_{NH} \text{N(imino)-H(phen)}$

$\{9.17,223.63\}$
2D $^1$H-$^{15}$N HMQC NMR spectrum of 7 in CD$_2$Cl$_2$ at 298 K. $^1J_{NH} = 70$ Hz
$^1$H NMR spectrum of $38^\text{f}$ in CD$_2$Cl$_2$ at 298 K.
2D COSY NMR spectrum of 38F in CD$_2$Cl$_2$ at 298 K
DEPT-135 NMR spectrum of $38^\text{F}$ in CD$_2$Cl$_2$ at 298 K
2D HSQC NMR spectrum of $38^F$ in CD$_2$Cl$_2$ at 298 K
2D HMBC NMR spectrum of 38F in CD$_2$Cl$_2$ at 298 K
$^{13}\text{C}$ NMR spectrum of 38$_F$ in CD$_2$Cl$_2$ at 298 K
2D 1H-15N HMBC NMR spectrum of 38F in CD\textsubscript{2}Cl\textsubscript{2} at 298 K
$^3$P NMR spectrum of 38$^F$ in CD$_2$Cl$_2$ at 298 K
$^{1}\text{H} \text{NMR spectrum of 39 in CD}_2\text{Cl}_2$ at 298 K.
$^1$H$^{31}$P NMR spectrum of 39 in CD$_2$Cl$_2$ at 298 K.
$^{31}$P NMR spectrum of 39 in CD$_2$Cl$_2$ at 298.
2D COSY NMR spectrum of 39 in CD$_2$Cl$_2$ at 298 K
DEPT-135 NMR spectrum of 39 in CD$_2$Cl$_2$ at 298 K.
2D HSQC NMR spectrum of 39 in CD$_2$Cl$_2$ at 298 K
2D HMBC NMR spectrum of 39 in CD$_2$Cl$_2$ at 298 K
2D $^1$H-$^{15}$N HMBC NMR spectrum of 39 in CD$_2$Cl$_2$ at 298 K. $J_{\text{NH}} = 7$ Hz.
$^{13}$C NMR spectrum of 39 in CD$_2$Cl$_2$ at 298 K.
$^1$H NMR spectrum of 40M, 40m in THF-$d_8$ at 233 K
$^1$H NMR spectrum of $40\text{M}, 40\text{m}$ in THF-d$_8$ at 193 K. Residual toluene is marked *.
2D COSY NMR spectrum of 40M, 40m in THF-d$_8$ at 193 K
2D TOCSY NMR spectrum of 40M, 40m in THF-d$_8$ at 193 K
$^{31}$P NMR spectrum of 40M, 40m in THF-d$_8$ at 193 K
2D HSQC NMR spectrum of 40M, 40m in THF-d₈ at 193 K
2D HMBC NMR spectrum of 40M, 40m in THF-d₈ at 193 K
2D HMBC NMR spectrum of 40M, 40m in THF-d$_8$ at 193 K (enlargement).
DEPT-135 NMR spectrum of 40M, 40m in THF-d₈ at 193 K. Residual toluene is marked *. 
$^{13}$C NMR spectrum of **40M**, **40m** in THF-$d_8$ at 193 K with CO signals enlargement. Residual toluene is marked *.
2D $^{29}$Si-$^1$H HSQC NMR spectrum of 40M, 40m in THF-d$_8$ at 193 K
2D NOESY NMR spectrum of 40M, 40m in THF-d8 at 233 K

NOE contact between H_4 and PMe_3 for 3M
2D $^1$H-$^{31}$P HMBC NMR spectrum of 40M, 40m in THF-d$_8$ at 193 K
2D $^1$H-$^{15}$N HMBC NMR spectrum of 40M, 40m in THF-d$_8$ at 193 K (enlargement of phen signals)
$^1$H NMR spectrum of a mixture of 40M, 40m and 37 in THF-d$_8$ at 273 K
$^{31}$P NMR of a 40M, 40m and 37 mixture evolution in THF-$d_8$
$^1$H NMR spectrum of 37 crude in THF-d$_8$ at 233 K
$^{31}$P NMR spectrum of 37 crude in THF-$d_8$ at 233 K
$^1$H 2D TOCSY NMR spectrum of 37 crude in THF-d$_8$ at 233 K
$^1$H-$^{31}$P 2D HMBC NMR spectrum of 37 crude in THF-d$_8$ at 233 K
$^1$H NMR spectrum of 40M, 40m in toluene-$d_8$ at 253 K
2D COSY NMR spectrum of \textbf{40M}, \textbf{40m} in toluene-d$_8$ at 253 K
$^{31}$P NMR spectrum of 40M, 40m in toluene-d$_8$ at 253 K
2D HMBC $^1$H-$^{15}$N NMR spectrum of 40M, 40m in toluene-$d_8$ at 253 K
2D NOESY NMR spectrum of 40M, 40m in toluene-d₈ at 253 K
$^{1}$H NMR spectrum of a mixture of $40M$, $40m$ and $37$ in toluene-$d_8$ at 253 K
$^{31}$P NMR of a 40M, 40m and 37 mixture evolution in toluene-$d_8$ at 298 K
2D $^1$H DOSY NMR of 40M, 40m and 37 mixture in toluene-d$_8$ at 298 K
2D 1H DOSY NMR of 40M, 40m and 37 mixture in toluene-d₈ at 298 K (enlargement of phen signals)
1H NMR spectrum of crude 40M, 40m from reaction of 36 with KN(SiMe₃)₂ in the presence of 1 eq. of phen in THF-d₈ at 233 K.
$^{31}$P NMR spectrum of crude $40\text{M}, 40\text{m}$ from reaction of $36$ with $\text{KN(SiMe}_3\text{)}_2$ in the presence of 1 eq. of phen in THF-$d_8$ at 233 K
COSY NMR spectrum of crude 40M, 40m from reaction of 36 with KN(SiMe₃)₂ in the presence of 1 eq. of phen in THF-d₈ at 233 K
H NMR spectrum of crude 40M, 40m from reaction of 36 with KN(SiMe$_3$)$_2$ in the presence of 1 eq. of phen after addition of excess phen in THF-d$_8$ at 233 K
$^1$H NMR spectrum of **41** in CD$_2$Cl$_2$ at 298 K.
$^{31}$P NMR spectrum of 41 in CD$_2$Cl$_2$ at 298 K.
2D COSY NMR spectrum of 41 in CD₂Cl₂ at 298 K.
2D HSQC NMR spectrum of 41 in CD$_2$Cl$_2$ at 298 K.
\(^{13}\)C NMR spectrum of 41 in CD\(_2\)Cl\(_2\) at 298 K.
\(^1\)H NMR spectrum of 43M, 43m in toluene-\(d_8\) at 298 K.
2D COSY NMR spectrum of 43M, 43m in toluene-d$_8$ at 298 K.
DEPT-135 NMR spectrum of 43M, 43m in toluene-d₈ at 298 K.
2D HSQC NMR spectrum of 43M, 43m in toluene-d$_8$ at 298 K.
2D HMBC NMR spectrum of 43M, 43m in toluene-d$_8$ at 298 K.
$^{13}$C NMR spectrum of 43M, 43m in toluene-d$_8$ at 298 K.
$^{31}$P NMR spectrum of 43M, 43m in toluene-d$_8$ at 298 K.
$^1$H NMR spectrum of 45M, 45m in toluene-d$_8$ at 253 K.
$^{31}$P NMR spectrum of 45M, 45m in toluene-$d_8$ at 253 K.
2D $^1$H-$^{29}$Si HMQC NMR spectrum of 45M, 45m in toluene-d$_8$ at 253 K.
2D COSY NMR spectrum of 45M, 45m in toluene-d$_8$ at 253 K.
DEPT-135 NMR spectrum of 45M, 45m in toluene-d$_8$ at 253 K.
2D HSQC NMR spectrum of **45M, 45m** in toluene-\(d_8\) at 253 K.
2D HMBC NMR spectrum of 45M, 45m in toluene-d$_8$ at 253 K.
$^{13}$C NMR spectrum of 45M, 45m in toluene-d$_8$ at 253 K.
$^1$H NMR spectrum of 42 in CD$_2$Cl$_2$ at 298 K.
COSY NMR spectrum of 42 in CD$_2$Cl$_2$ at 298 K.
$^{31}$P NMR spectrum of 42 in CD$_2$Cl$_2$ at 298 K.
2D HSQC NMR spectrum of 42 in CD$_2$Cl$_2$ at 298 K.
$^{13}$C NMR spectrum of 42 in CD$_2$Cl$_2$ at 298 K.
$^1$H NMR spectrum of 44 in toluene-$d_8$ at 298 K.
COSY NMR spectrum of 44 in toluene-d$_8$ at 298 K.
DEPT-135 NMR spectrum of 44 in toluene-d$_8$ at 298 K.
2D HSQC NMR spectrum of 44 in toluene-d$_8$ at 298 K.
2D HMBC NMR spectrum of 44 in toluene-d$_8$ at 298 K.
$^{31}$P NMR spectrum of 44 in toluene-d$_8$ at 298 K.
$^{13}$C NMR spectrum of 44 in toluene-$d_8$ at 298 K.
$^1$H NMR spectrum of 46M, 46m in toluene-d$_8$ at 253 K.
COSY NMR spectrum of 46M, 46m in toluene-d$_8$ at 253 K.
$^{31}$P NMR spectrum of 46M, 46m in toluene-d$_8$ at 253 K.
$^1$H-^{29}$Si HMQC NMR spectrum of 46M, 46m in toluene-$d_8$ at 253 K.
2D $^1$H NOESY NMR spectrum of 46M, 46m in toluene-$d_8$ at 253 K.
DEPT-135 NMR spectrum of 46M, 46m in toluene-d₈ at 253 K.
2D HSQC NMR spectrum of 46M, 46m in toluene-d$_8$ at 253 K.
2D HMBC NMR spectrum of 46M, 46m in toluene-\(d_8\) at 253 K.
$^{13}$C NMR spectrum of 46M, 46m in toluene-$d_8$ at 253 K.
$^1$H NMR spectrum of 47 in CD$_2$Cl$_2$ at 298 K.
$^{31}$P NMR spectrum of 47 in CD$_2$Cl$_2$ at 298 K.
$^{13}$C DEPT-135 NMR spectrum of 47 in CD$_2$Cl$_2$ at 298 K.
$^1$H-$^{13}$C HSQC NMR spectrum of 47 in CD$_2$Cl$_2$ at 298 K.
$^1$H-$^{13}$C HMBC NMR spectrum of 47 in CD$_2$Cl$_2$ at 298 K.
$^{13}$C NMR spectrum of 47 in CD$_2$Cl$_2$ at 298 K.
1H NMR spectrum of 49M, 49m in THF-d₈ at 253 K.
$^{1}H-^{1}H$ COSY NMR spectrum of 49M, 49m in THF-d$_8$ at 253 K.
$^{31}$P NMR spectrum of $49\text{M}, 49\text{m}$ in THF-$d_8$ at 253 K.
$^1$H-$^{13}$C HSQC NMR spectrum of 49M, 49m in THF-d$_8$ at 253 K.
$^{1}H-^{13}C$ HMBC NMR spectrum of 49M, 49m in THF-d$_8$ at 253 K.
$^{1}$H-$^{29}$Si HMQC NMR spectrum of $49\text{M}, 49\text{m}$ in THF-$d_{8}$ at 253 K.
\(^{13}\)C DEPT-135 NMR spectrum of 49M, 49m in THF-d\(_8\) at 253 K.
$^{13}$C NMR spectrum of 49M, 49m in THF-d$_8$ at 253 K.
$^1$H NMR spectrum of 50M, 50m in toluene-$d_8$ at 253 K.
$^1$H NMR spectrum of 50M, 50m in toluene-d$_8$ at 253 K.
$^1$H-$^1$H COSY NMR spectrum of 50M, 50m in toluene-$d_8$ at 253 K.
$^1$H-$^{29}$Si HMQC NMR spectrum of 50M, 50m in toluene-d$_8$ at 253 K.
\[ ^{13}\text{C} \text{ DEPT-135 NMR spectrum of } 50\text{M}, \, 50\text{m} \text{ in toluene-d}_8 \text{ at } 253 \text{ K}. \]
$^1$H-$^{13}$C HMBC NMR spectrum of 50M, 50m in toluene-d$_8$ at 253 K.
$^{13}$C NMR spectrum of 50M, 50m in toluene-$d_8$ at 253 K.
$^1$H NMR spectrum of 48 in CD$_2$Cl$_2$ at 298 K.
H-H COSY NMR spectrum of 48 in CD$_2$Cl$_2$ at 298 K.
$^{13}$C DEPT-135 NMR spectrum of 48 in CD$_2$Cl$_2$ at 298 K.
$^1$H-$^{13}$C HSQC NMR spectrum of 48 in CD$_2$Cl$_2$ at 298 K.
$^1$H-$^{13}$C HMBC NMR spectrum of 48 in CD$_2$Cl$_2$ at 298 K.
$^{13}$C NMR spectrum of 48 in CD$_2$Cl$_2$ at 298 K.
$^1$H NMR spectrum of 51M, 51m in THF-d$_8$ at 253 K.
$^1\text{H}^-1\text{H}$ COSY NMR spectrum of 51M, 51m in THF-d$_8$ at 253 K.
$^{13}$C DEPT-135 NMR spectrum of 51M, 51m in THF-d$_8$ at 253 K.
$^{13}$C NMR spectrum of 51M, 51m in THF-d$_8$ at 253 K.
$^1$H-$^{29}$Si NMR spectrum of $51M$, $51m$ in THF-$d_8$ at 253 K.
$^1$H NMR spectrum of 52M-C2 in toluene-$d_8$ at 298 K.
$^{31}$P NMR spectrum of 52M-C2 in toluene-d$_8$ at 298 K.
COSY NMR spectrum of 52M-C2 in toluene-$d_8$ at 298 K.
DEPT-135 NMR spectrum of 52M-C2 in toluene-d$_8$ at 298 K.
2D $^1$H-$^{13}$C HSQC NMR spectrum of 52M-C2 in toluene-$d_8$ at 298 K.
2D $^1$H-$^{13}$C HMBC NMR spectrum of 52M-C2 in toluene-$d_8$ at 298 K.
NOE between H$_2$ and PMe$_3$. 2D NOESY NMR spectrum of 52M-C2 in toluene-d$_8$ at 298 K.
$^{13}$C NMR spectrum of 52M-C2 in toluene-$d_8$ at 298 K.
$^1$H NMR spectrum of 52M-C2, 52m-C2, 52M-C4 and 52m-C4 in toluene-$d_8$ at 298 K.
$^{31}$P NMR spectrum of 52M-C2, 52m-C2, 52M-C4 and 52m-C4 in toluene-$d_8$ at 298 K.
$^2J_{NH} H_2$ and N amido 4M-C4

$^3J_{NH} CH_3$ and N amido 4M-C2

$^2J_{NH} H_9$ and N imino 4M-C4

$^2J_{NH} H_9$ and N imino 4M-C2

$^1H-^{15}N$ HMBC NMR spectrum of 52M-C2, 52m-C2, 52M-C4 and 52m-C4 in toluene-d$_8$ at 298 K $J_{NH} = 7$Hz.
NOE between $H_2$ and PMe$_3$ 4M-C2

2D NOESY spectrum of 52M-C2, 52m-C2, 52M-C4 and 52m-C4 in toluene-$d_8$ at 298 K.
$^1$H-$^{31}$P HMBC NMR spectrum of 52M-C2, 52m-C2, 52M-C4 and 52m-C4 in toluene-d$_8$ at 298 K.
COSY NMR spectrum of 52M-C2, 52m-C2, 52M-C4 and 52m-C4 in toluene-d$_8$ at 298 K.
DEPT-135 NMR spectrum of 52M-C2, and 52M-C4 in toluene-d₈ at 298 K.
2D $^1$H-$^{13}$C HMBC NMR spectrum of 52M-C2, 52m-C2, 52M-C4 and 52m-C4 in toluene-$d_8$ at 298 K.
2D $^1$H-$^{13}$C HMBC NMR spectrum of 52M-C2, 52m-C2, 52M-C4 and 52m-C4 in toluene-d$_8$ at 298 K (enlargement).
2D $^1$H-$^{13}$C HSQC NMR spectrum of $52M$-C2, $52m$-C2, $52M$-C4 and $52m$-C4 in toluene-$d_8$ at 298 K.
$^{13}$C NMR spectrum of 52M-C2, and 52M-C4 in toluene-$d_8$ at 298 K.
$^1$H NMR 16 hours 30 minutes monitoring of 52M-C2, 52m-C2, 52M-C4 and 52m-C4 in the presence of C$_6$Me$_6$ in benzene-d$_6$ at 298 K (enlargement of phen-bonded methyl and C$_6$Me$_6$ signals.)
2D $^1$H DOSY NMR of 52M-C2, 52m-C2, 52M-C4 and 52m-C4 in toluene-$d_8$ at 298 K
2D $^1$H DOSY NMR of 52M-C2, 52m-C2, 52M-C4 and 52m-C4 in toluene-$d_8$ at 298 K (enlargement of phen-bonded methyl and P-methyl groups)

$log \, D = -9.02 \, m^2/s$
$^1H$ NMR spectrum of 53 in toluene-$d_8$ at 298 K
COSY NMR spectrum of 53 in toluene-\textit{d}_8 at 298 K
DEPT-135 NMR spectrum of 53 in toluene-d$_8$ at 298 K
$^{1}H-^{13}C$ HSQC NMR spectrum of 53 in toluene-$d_8$ at 298 K
$^{1}H-^{13}C$ HMBC NMR spectrum of 53 in toluene-$d_8$ at 298 K
$^{13}$C NMR spectrum of 53 in toluene-$d_8$ at 298 K
$^1$H NMR spectrum of 54 in CD$_2$Cl$_2$ at 298 K
$\text{H-}^{13}\text{C HSQC NMR spectrum of 54 in CD}_2\text{Cl}_2 \text{ at 298 K}$
$^1$H-$^{13}$C HMBC NMR spectrum of 54 in CD$_2$Cl$_2$ at 298 K
$^{13}$C NMR spectrum of 54 in CD$_2$Cl$_2$ at 298 K
$^{31}$P NMR spectrum of 54 in CD$_2$Cl$_2$ at 298 K
$^1$H NMR spectrum of 55M, 55m in toluene-d$_8$ at 298 K
The ¹H-¹H COSY NMR spectrum of 55M, 55m in toluene-d₈ at 298 K.
$^{13}$C DEPT-135 NMR spectrum of 55M, 55m in toluene-$d_8$ at 298 K
$^{1}\text{H}^{13}\text{C}$ HSQC NMR spectrum of 55M, 55m in toluene-d$_8$ at 298 K
$^1\text{H}-^{13}\text{C}$ HMBC NMR spectrum of 55M, 55m in toluene-d$_8$ at 298 K
\[ ^{13}C \text{ NMR spectrum of 55M, 55m in toluene-d}_8 \text{ at 298 K} \]
$^{31}$P NMR spectrum of 55M, 55m in toluene-d$_8$ at 298 K
$^1$H NMR spectrum of 56-C2, 56M-C4 and 56m-C4 in toluene-d$_8$ at 298 K
$^1$H-$^1$H COSY NMR spectrum of 56-C2, 56M-C4 and 56m-C4 in toluene-d$_8$ at 298 K
$^{31}$P NMR spectrum of 56-C2, 56M-C4 and 56m-C4 in toluene-d₈ at 298 K
$^1$H-$^{15}$N HMBC NMR spectrum of 56-C2, 56M-C4 and 56m-C4 in toluene-d$_8$ at 298 K
$^1$H-$^{31}$P HMBC NMR spectrum of 56-C2, 56M-C4 and 56m-C4 in toluene-d$_8$ at 298 K
$^{13}$C DEPT-135 NMR spectrum of 56-C2, 56M-C4 and 56m-C4 in toluene-$d_8$ at 298 K
$^1$H-$^1$H NOESY NMR spectrum of 56-C2, 56M-C4 and 56m-C4 in toluene-d$_8$ at 298 K
$^1$H-$^1$H NOESY NMR spectrum of 56-C2, 56M-C4 and 56m-C4 in toluene-$d_8$ at 298 K (enlargement)
$^1$H-$^{13}$C HSQC NMR spectrum of 56-C2, 56M-C4 and 56m-C4 in toluene-$d_8$ at 298 K
$^1$H-$^{13}$C HMBC NMR spectrum of 56-C2, 56M-C4 and 56m-C4 in toluene-d₈ at 298 K
$^{13}$C NMR spectrum of 56-C2, 56M-C4 and 56m-C4 in toluene-$d_8$ at 298 K
$^1$H NMR spectrum of 57 in benzene-d$_6$ at 298 K
$^1$H-$^1$H NOESY NMR spectrum of 57 in benzene-d$_6$ at 298 K
$^{13}$C DEPT-135 NMR spectrum of 57 in benzene-d$_6$ at 298 K
$^1$H-$^{13}$C HSQC NMR spectrum of 57 in benzene-d$_6$ at 298 K
$^{1}$H-$^{13}$C HMBC NMR spectrum of 57 in benzene-$d_6$ at 298 K
$^{13}$C NMR spectrum of 57 in benzene-$d_6$ at 298 K
1H NMR spectrum of 58 in toluene-d$_8$ at 298 K
$^{31}$P NMR spectrum of 58 in toluene-$d_8$ at 298 K
$^1$H-$^1$H COSY NMR spectrum of 58 in toluene-d$_8$ at 298 K
$^{13}$C DEPT-135 NMR spectrum of 58 in toluene-$_2^\text{d}_8$ at 298 K
$^1$H-$^{13}$C HSQC NMR spectrum of 58 in toluene-$d_8$ at 298 K
$^1$H-$^{13}$C HMBC NMR spectrum of 58 in toluene-$d_8$ at 298 K
$^1$H-$^1$H NOESY NMR spectrum of 58 in toluene-$d_8$ at 298 K
$^{13}$C NMR spectrum of 58 in toluene-$d_8$ at 298 K
$^{1}$H NMR spectrum of 59M, 59m and 36 in CD$_2$Cl$_2$ at 298 K
$^1$H-$^1$H COSY NMR spectrum of 59M, 59m and 36 in CD$_2$Cl$_2$ at 298 K
NMR spectrum of $^{59}\text{M}$, $^{59}\text{m}$ and $^{36}$ in CD$_2$Cl$_2$ at 298 K
$^{1H-13C}$ HSQC NMR spectrum of 59M, 59m and 36 in CD$_2$Cl$_2$ at 298 K
$^1$H-$^{13}$C HMBC NMR spectrum of 59M, 59m and 36 in CD$_2$Cl$_2$ at 298 K
$^{13}$C NMR spectrum of 59M, 59m and 36 in CD$_2$Cl$_2$ at 298 K
$^{31}$P NMR spectrum of 59M, 59m and 36 in CD$_2$Cl$_2$ at 298 K
$^1$H NMR spectrum of 60M, 60m and 36 in CD$_2$Cl$_2$ at 298 K
$^{1}$H-$^{1}$H COSY NMR spectrum of 60M, 60m and 36 in CD$_2$Cl$_2$ at 298 K
$^1$H-$^{13}$C HSQC NMR spectrum of 60M, 60m and 36 in CD$_2$Cl$_2$ at 298 K
$^{1}$H-$^{13}$C HMBC NMR spectrum of 60M, 60m and 36 in CD$_2$Cl$_2$ at 298 K
$^{13}$C NMR spectrum of 60M, 60m and 36 in CD$_2$Cl$_2$ at 298 K
\(^1\)H NMR spectrum of \(\text{61} \) in toluene-\(d_8\) at 298 K
$^1$H-$^1$H COSY NMR spectrum of 61 in toluene-d$_8$ at 298 K
$^{31}$P NMR spectrum of 61 in toluene-$d_8$ at 298 K
$^{13}$C DEPT-135 NMR spectrum of 61 in toluene-$d_8$ at 298 K
$^{1}H-^{13}C$ HSQC NMR spectrum of 61 in toluene-$d_8$ at 298 K
$^1$H-$^{13}$C HMBC NMR spectrum of 61 in toluene-$d_8$ at 298 K
$^{13}$C NMR spectrum of 61 in toluene-$d_8$ at 298 K
$^{1}H$-$^{15}N$ HMBC NMR spectrum of 61 in toluene-$d_8$ at 298 K
\( ^1\text{H} \) NMR spectrum of 62-C4 and 62-C2 in toluene-d\(_8\) at 273 K
$^1$H-$^1$H COSY NMR spectrum of 62-C4 and 62-C2 in toluene-d$_8$ at 273 K
$^{31}$P NMR spectrum of 62-C4 and 62-C2 in toluene-d$_8$ at 273 K
$^1$H-$^{13}$C HSQC NMR spectrum of 62-C4 and 62-C2 in toluene-d$_8$ at 273 K
$^{13}$C NMR spectrum of 62-C4 and 62-C2 in toluene-$d_8$ at 273 K
\(^1\)H NMR of compound 63 in CD\(_2\)Cl\(_2\) at 298 K.
2D COSY NMR of compound 63 in CD$_2$Cl$_2$ at 298 K.
2D HSQC NMR of compound 63 in CD$_2$Cl$_2$ at 298 K.
DEPT-135 NMR of compound 63 in CD$_2$Cl$_2$ at 298 K.
$^{13}$C NMR of compound 63 in CD$_2$Cl$_2$ at 298 K.
$^{1}$H NMR of compound 63$^f$ in CD$_2$Cl$_2$ at 298 K.
2D COSY NMR of compound 63\textsuperscript{F} in CD\textsubscript{2}Cl\textsubscript{2} at 298 K.
DEPT-135 NMR of compound $63^F$ in CD$_2$Cl$_2$ at 298 K.
2D HSQC NMR of compound 63\textsuperscript{F} in CD\textsubscript{2}Cl\textsubscript{2} at 298 K.
2D HMBC NMR of compound 63F in CD$_2$Cl$_2$ at 298 K.
$^{13}$C NMR of compound $63^F$ in CD$_2$Cl$_2$ at 298 K.
$^1$H NMR of crude 66 in THF-d$_8$ at 233 K. * denotes toluene, + unknown impurities and ♦ BARF residues.
2D COSY NMR of crude 66 in THF-d$_8$ at 233 K.
DEPT-135 NMR of crude 66 in THF-\textsubscript{d\textregistered} at 233 K. ♦ denotes BARF residues.
2D HSQC NMR of crude 66 in THF-d\textsubscript{8} at 233 K.
2D HMBC NMR of crude 66 in THF-$d_8$ at 233 K.
$^{13}$C NMR of crude 66 in THF-d$_8$ at 233 K.
$^1$H NMR of compound 64 in CD$_2$Cl$_2$ at 298 K.
2D COSY NMR of compound 64 in CD$_2$Cl$_2$ at 298 K.
2D HSQC NMR of compound 64 in CD$_2$Cl$_2$ at 298 K.
DEPT-135 NMR of compound 64 in CD$_2$Cl$_2$ at 298 K.
2D HMBC NMR of compound 64 in CD$_2$Cl$_2$ at 298 K.
$^{13}$C NMR of compound 64 in CD$_2$Cl$_2$ at 298 K.
$^{1}$H NMR of compound 67 in THF-d$_8$ at 298 K.
2D COSY NMR of compound 67 in THF-d$_8$ at 298 K.
DEPT-135 NMR of compound 67 in THF-d$_8$ at 298 K.
2D HSQC NMR of compound 67 in THF-d$_8$ at 298 K.
2D HMBC NMR of compound 67 in THF-\textit{d}_8 at 298 K.
\textsuperscript{13}C NMR of compound 67 in THF-d\textsubscript{8} at 298 K.
H NMR of compound 65 in CD$_2$Cl$_2$ at 298 K.

Ar = p-tolyl
$^1$H-$^1$H COSY NMR of compound 65 in CD$_2$Cl$_2$ at 298 K.
$^{13}$C DEPT-135 NMR of compound 65 in CD$_2$Cl$_2$ at 298 K.
$^{13}$C NMR of compound 65 in CD$_2$Cl$_2$ at 298 K.
$^1$H-$^{13}$C HSQC NMR of compound 65 in CD$_2$Cl$_2$ at 298 K.
$^1$H NMR of compound 68 in THF-d$_8$ at 298 K.
$^1\text{H}-^1\text{H}$ COSY NMR of compound 68 in THF-$d_8$ at 298 K.
$^{13}$C DEPT-135 COSY NMR of compound 68 in THF-d$_8$ at 298 K.
$^1$H- $^{13}$C HSQC NMR of compound 68 in THF-d$_8$ at 298 K.
$^1$H NMR of compound 69 in CD$_2$Cl$_2$ at 298 K.
2D COSY NMR of compound 69 in CD$_2$Cl$_2$ at 298 K.
2D HSQC NMR of compound 69 in CD$_2$Cl$_2$ at 298 K.
$^{13}$C NMR of compound 69 in CD$_2$Cl$_2$ at 298 K.
$^1$H NMR of crude 71 in THF-$_2$ at 193 K.
2D COSY NMR of crude 71 in THF-d$_8$ at 193 K.
DEPT-135 NMR of crude 71 in THF-d$_8$ at 193 K.
2D HMBC NMR of crude 71 in THF-\textsubscript{d}_8 at 193 K.
$^{13}$C NMR of crude 71 in THF-d$_8$ at 193 K.
$^1$H NMR of compound 70 in CD$_2$Cl$_2$ at 298 K.
2D COSY NMR of compound 70 in CD₂Cl₂ at 298 K.
2D HSQC NMR of compound 70 in CD$_2$Cl$_2$ at 298 K.
DEPT-135 NMR of compound 70 in CD$_2$Cl$_2$ at 298 K.
2D HMBC NMR of compound 70 in CD$_2$Cl$_2$ at 298 K.
2D $^1$H,$^{15}$N-HMBC NMR of compound 70 in CD$_2$Cl$_2$ at 298 K.
$^{13}$C NMR of compound 70 in CD$_2$Cl$_2$ at 298 K.
$^1$H NMR of compound 72 in THF-d$_8$ at 298 K.
2D COSY NMR of compound 72 in THF-d$_8$ at 298 K.
DEPT-135 NMR of compound 72 in THF-d₈ at 298 K.
2D HSQC NMR of compound 72 in THF-d₈ at 298 K.
2D HMBC NMR of compound 72 in THF-d$_8$ at 298 K.
$^{13}$C NMR of compound 72 in THF-$d_8$ at 298 K.
$^1$H, $^{15}$N-HMBC NMR of compound 72 in THF-$d_8$ at 298 K ($J_{NH} = 7$ Hz).
$^1$H NMR of crude 72 in toluene-$d_8$ at 298 K. * denotes residual BARF.
2D COSY NMR of crude 72 in toluene-$d_8$ at 298 K.
DEPT-135 NMR of crude 72 in toluene-d₈ at 298 K.
2D HMBC NMR of crude 72 in toluene-d$_8$ at 298 K.
\(^{13}\)C NMR of crude 72 in toluene-\(d_8\) at 298 K.
$^1$H NMR of compound 73 in CD$_2$Cl$_2$ at 298 K.
2D COSY NMR of compound 73 in CD$_2$Cl$_2$ at 298 K.
DEPT-135 NMR of compound 73 in CD$_2$Cl$_2$ at 298 K.
2D HSQC NMR of compound 73 in CD$_2$Cl$_2$ at 298 K.
$^{13}$C NMR of compound 73 in CD$_2$Cl$_2$ at 298 K.
$^1$H NMR of compound 77 in THF-d$_8$ at 298 K.
2D COSY NMR of compound 77 in THF-d$_8$ at 298 K.
DEPT-135 NMR of compound 77 in THF-d$_8$ at 298 K.
2D HSQC NMR of compound 77 in THF-d$_8$ at 298 K.
2D HMBC NMR of compound 77 in THF-d$_8$ at 298 K.
$^{13}$C NMR of compound 77 in THF-d$_8$ at 298 K.
\(^1\)H NMR of compound 74 in CD\(_2\)Cl\(_2\) at 298 K. * denotes residual toluene.
2D COSY NMR of compound 74 in CD$_2$Cl$_2$ at 298 K.
DEPT-135 NMR of compound 74 in CD$_2$Cl$_2$ at 298 K.
2D HSQC NMR of compound 74 in CD$_2$Cl$_2$ at 298 K.
$^{13}$C NMR of compound 74 in CD$_2$Cl$_2$ at 298 K.
\(^1\)H NMR of compound 78 in THF-d\(_8\) at 298 K. * denotes residual toluene and + an unknown impurity.
2D COSY NMR of compound 78 in THF-d$_8$ at 298 K.
DEPT-135 NMR of compound 78 in THF-d$_8$ at 298 K.
2D HSQC NMR of compound 78 in THF-d$_8$ at 298 K.
2D HMBC NMR of compound 78 in THF-d₈ at 298 K.
$^{13}$C NMR of compound 78 in THF-$d_8$ at 298 K.
\(^1\)H NMR of compound 75 in CD\(_2\)Cl\(_2\) at 298 K.
$^1\text{H}-^1\text{H}$ COSY NMR of compound 75 in CD$_2$Cl$_2$ at 298 K.
$^1$H-$^{13}$C HSQC NMR of compound 75 in CD$_2$Cl$_2$ at 298 K.
$^{1}H-^{13}C$ HMBC NMR of compound 75 in CD$_2$Cl$_2$ at 298 K.
$^{13}$C NMR of compound 75 in CD$_2$Cl$_2$ at 298 K.
$^1\text{H NMR of compound 79 in THF-d}_8$ at 273 K.
$^{1}H-^{1}H$ COSY NMR of compound 79 in THF-d$_8$ at 263 K.
$^{13}$C NMR of compound 79 in THF-$d_8$ at 263 K.
$^{13}$C DEPT-135 NMR of compound 79 in THF-d$_8$ at 298 K.
$^{1}$H-$^{13}$C HSQC NMR of compound 79 in THF-d$_8$ at 298 K.
$^1$H-$^{13}$C HMBC NMR of compound 79 in THF-$d_8$ at 298 K.
$^1$H-$^1$H NOESY NMR of compound 79 in THF-d$_8$ at 273 K.
$^1$H NMR of compound 76 in CD$_2$Cl$_2$ at 298 K.
$^1$H-$^1$H COSY NMR of compound 76 in CD$_2$Cl$_2$ at 298 K.
$^{1}{\text{H}}-^{13}{\text{C}}$ HSQC NMR of compound 76 in CD$_2$Cl$_2$ at 298 K.
$^1\text{H} - ^{13}\text{C}$ HMBC NMR of compound 76 in CD$_2$Cl$_2$ at 298 K.
$^{13}$C NMR of compound 76 in CD$_2$Cl$_2$ at 298 K.
\(^1\text{H} \text{NMR of compound 80 in toluene-d}_8 \text{ at } 298 \text{ K.}\)
$^1\text{H}-^1\text{H}$ COSY NMR of compound 80 in toluene-$d_8$ at 298 K.
$^{13}$C DEPT-135 NMR of compound 80 in toluene-$d_8$ at 298 K.
$^1$H-$^{13}$C HSQC NMR of compound 80 in toluene-d$_8$ at 298 K.
$^1$H-$^{13}$C HMBC NMR of compound 80 in toluene-$d_8$ at 298 K.
$^1$H-$^1$H NOESY NMR of compound 80 in toluene-$d_8$ at 298 K.
$^{13}$C NMR of compound 80 in toluene-$d_8$ at 298 K.
$^1$H NMR of compound 81 in CD$_2$Cl$_2$ at 298 K.
$^1$H-$^1$H COSY NMR of compound 81 in CD$_2$Cl$_2$ at 298 K.
$^{13}$C DEPT-135 NMR of compound 81 in CD$_2$Cl$_2$ at 298 K.
$^1$H-$^{13}$C HSQC NMR of compound 81 in CD$_2$Cl$_2$ at 298 K.
$^1$H-$^{13}$C HMBC NMR of compound 81 in CD$_2$Cl$_2$ at 298 K.
$^{13}$C NMR of compound 81 in CD$_2$Cl$_2$ at 298 K.
$^{1}$H NMR of compound 82 in CD$_2$Cl$_2$ at 298 K.
$^1$H$^1$H COSY NMR of compound 82 in CD$_2$Cl$_2$ at 298 K.
$^{13}$C DEPT-135 NMR of compound 82 in CD$_2$Cl$_2$ at 298 K.
$^1$H-$^{13}$C HSQC NMR of compound 82 in CD$_2$Cl$_2$ at 298 K.
$^{13}$C HMBC NMR of compound 82 in CD$_2$Cl$_2$ at 298 K.
$^{13}$C NMR of compound 82 in CD$_2$Cl$_2$ at 298 K.
$^1$H NMR of compound 83 in CD$_2$Cl$_2$ at 298 K.
$^1$H-$^1$H COSY NMR of compound 83 in CD$_2$Cl$_2$ at 298 K.
$^{13}$C DEPT-135 NMR of compound 83 in CD$_2$Cl$_2$ at 298 K.
$^1$H-$^{13}$C HSQC NMR of compound 83 in CD$_2$Cl$_2$ at 298 K.
$^{1}H-^{13}C$ HMBC NMR of compound 83 in CD$_2$Cl$_2$ at 298 K.
$^{13}$C NMR of compound 83 in CD$_2$Cl$_2$ at 298 K.
$^1$H NMR of compound 84 in THF-d$_8$ at 298 K.
$^{13}$C DEPT-135 NMR of compound 84 in THF-d$_8$ at 298 K.
$^{1}H-^{13}C$ HSQC NMR of compound 84 in THF-d$_8$ at 298 K.
$^1$H-$^{13}$C HMBC NMR of compound 84 in THF-d$_8$ at 298 K.
\(^{13}\)C NMR of compound \textbf{84} in THF-\(d_8\) at 298 K.
$^1$H NMR of compound 85 in THF-d$_8$ at 298 K.
$^1$H-$^1$H COSY NMR of compound 85 in THF-d$_8$ at 298 K.
$^{13}$C DEPT-135 NMR of compound 85 in THF-d$_8$ at 273 K.
$^1$H-$^{13}$C HSQC NMR of compound 85 in THF-d$_8$ at 273 K.
$^{1}H$-$^{13}C$ HMBC NMR of compound 85 in THF-$d_8$ at 273 K.
$^{13}$C NMR of compound 85 in THF-d$_8$ at 273 K.
$^1$H NMR spectra of compounds 84 and 85 in THF-d$_8$ at 298 K (enlargement of bipy signals).
$^1$H NMR spectra of compounds 84 and 85 in THF-d$_8$ at 298 K (enlargement of H5 and H6 bipy signals).
$^1$H NMR spectra of compounds 84 and 85 in THF-$d_8$ at 298 K (enlargement of CH(Im) signals).
$^{1}H$ NMR spectrum of the evolution of 85 to 84 in THF-d$_8$ after 2 hours at 298 K.
$^1$H-$^1$H COSY NMR spectrum of the evolution of 85 to 84 in THF-\textit{d}_8 after 2 hours at 298 K.
H NMR spectrum of the evolution of $^85$ to $^84$ in THF-$d_8$ after 6 hours at 298 K.

$^1$H NMR spectrum of the evolution of $^85$ to $^84$ in THF-$d_8$ after 6 hours at 298 K.
$^1$H NMR of compound 67 in toluene-$d_8$ at 298 K.
$^1$H NMR of compound 67 upon addition of 1 eq. of PMe$_3$ in tol-d$_8$ at 298 K.
$^{31}$P NMR of compound 67: 5 minutes of reaction with 1 eq. of PMe$_3$ in tol-d$_8$ at 298 K.
$^1$H NMR of compound 67: 30 minutes of reaction with 1 eq. of PMe$_3$ in toluene-d$_8$ at 298 K.
COSY NMR of compound 67: 30 minutes of reaction with 1 eq. of PMe₃ in tol-d₈ at 298 K.
$^1$H NMR of compound 67: 2 hours and 30 minutes of reaction with 1 eq. of PMe$_3$ in tol-$d_8$ at 298 K.
$^{31}$P NMR of compound 67: 2 hours and 30 minutes of reaction with 1 eq. of PMe$_3$ in toluene-$d_8$ at 298 K.
$^1$H NMR of compound 67: 5 hours of reaction with 1 eq. of PMe$_3$ in tol-d$_8$ at 298 K.
COSY NMR of compound 67: 5 hours of reaction with 1 eq. of PMe$_3$ in toluene-d$_8$ at 298 K.
$^{31}$P NMR of compound 67: 5 hours of reaction with 1 eq. of PMe$_3$ in tol-d$_8$ at 298 K.
$^1$H NMR of compound 86 after evaporation of volatiles in tol-d$_8$ at 298 K.
$^1$H NMR of compound 86 in toluene-d$_8$ at 298 K.
2D COSY NMR of compound 86 in tol-d$_8$ at 298 K.
DEPT-135 NMR of compound 86 in tol-d₈ at 298 K.
$^1$H, $^{13}$C-HSQC NMR of compound 86 in toluene-$d_8$ at 298 K.
$^1$H,$^{13}$C-HMBC NMR of compound 86 in toluene-$d_8$ at 298 K.
$^{13}$C NMR of compound 86 in toluene-d$_8$ at 298 K.
$^{31}$P NMR of compound 86 in tol-d$_8$ at 298 K. * denotes unknown impurities
H NMR of compound 72 in toluene-d$_8$ at 298 K.

$^1$H NMR of compound 72 in toluene-d$_8$ at 298 K.
$^1$H NMR of compound 87 in toluene-d$_8$ at 298 K after addition of a slight excess of PMe$_3$. * denotes excess PMe$_3$. 

+ 1.1 eq PMe$_3$
Comparison of $^1$H NMR spectra of 72 and 87 of in toluene-d$_8$ at 298 K.
$^{31}$P NMR of compound 87 in toluene-d$_8$ at 298 K after addition of slight excess of PMe$_3$
2D COSY NMR of compound 87 in toluene-d₈ at 298 K after addition of PMe₃
$^{1}H-^{31}P$ HMBC NMR spectrum of compound 87 in toluene-d$_8$ at 298 K after addition of a slight excess of PMe$_3$. 
$^1$H NMR of compound 87 in toluene-$d_8$ at 298 K after evaporation of volatiles.
2D COSY NMR of compound 87 in toluene-\textsubscript{d8} at 298 K.
DEPT-135 NMR of compound 87 in toluene-d₈ at 298 K.
2D HSQC NMR of compound 87 in toluene-d$_8$ at 298 K.
2D HMBC NMR of compound 87 in toluene-d$_8$ at 298 K.
$^{13}$C NMR of compound 87 in toluene-$d_8$ at 298 K.
$^{31}$P NMR of compound 87 in toluene-d$_8$ at 298 K.
$^{1}H, ^{15}N$-HMBC NMR of compound 87 in toluene-$d_8$ at 298 K.
$^{1}H, ^{15}N$-HMBC NMR of 2-methylpyridine in toluene-$d_{8}$ at 298 K.
\(^1\)H NMR of compound 78 in toluene-d\(_8\) at 298 K.
$^1$H NMR of compound 78 upon addition of 1.6 eq of PMe$_3$ in toluene-d$_8$ at 298 K.
31P NMR of compound 78 upon addition of 1.6 eq of PMe₃ in toluene-d₈ at 298 K.
$^1$H NMR of compound 78 23 hours of reaction with 1.6 eq of PMe$_3$ in toluene-$d_8$ at 298 K.
$^{31}$P NMR of compound 78 23 hours of reaction with 1.6 eq of PMe$_3$ in toluene-d$_8$ at 298 K.
2D COSY NMR of compound \textbf{78} 23 hours of reaction with 1.6 eq of PMe$_3$ in toluene-d$_8$ at 298 K.
1H NMR of compound 78 96 hours of reaction with 1.6 eq of PMe₃ in toluene-d₈ at 298 K. + 1.6 eq PMe₃
$^{31}$P NMR of compound 78 96 hours of reaction with 1.6 eq of PMe$_3$ in toluene-d$_8$ at 298 K.
2D COSY NMR of compound 78 96 hours of reaction with 1.6 eq of PMe$_3$ in toluene-d$_8$ at 298 K.
H NMR of compound 78 144 hours of reaction with 1.6 eq of PMe$_3$ and addition of 0.5 extra eq. of PMe$_3$ in toluene-d$_8$ at 298 K.

$^1$H NMR of compound 78 144 hours of reaction with 1.6 eq of PMe$_3$ and addition of 0.5 extra eq. of PMe$_3$ in toluene-d$_8$ at 298 K.
31P NMR of compound 78 144 hours of reaction with 1.6 eq of PMe₃ and addition of 0.5 extra eq. of PMe₃ in toluene-d₈ at 298 K.
$^1$H NMR of compound 88 in toluene-d$_8$ at 298 K.
2D COSY NMR of compound 88 in toluene-d$_8$ at 298 K.
DEPT-135 NMR of compound 88 in toluene-d8 at 298 K.
2D HSQC NMR of compound 88 in toluene-d$_8$ at 298 K.
2D HMBC NMR of compound 88 in toluene-d$_8$ at 298 K.
$^{13}$C NMR of compound 88 in toluene-d$_8$ at 298 K.
$^{31}\text{P}$ NMR of compound 88 in toluene-$d_8$ at 298 K.