Supplementary Material (ESI) for Dalton Transactions

Supporting Information

for the paper:

On-Step Synthesis of Mo(0) and W(0) Bis(Dinitrogen) Complexes with the Linear Tetraphosphine Ligand prP_4: Stereoselective Formation of *cis*-[$M(N_2)_2$(*rac*-prP_4)] and *trans*-[$M(N_2)_2$(*meso*-prP_4)]; M = Mo, W

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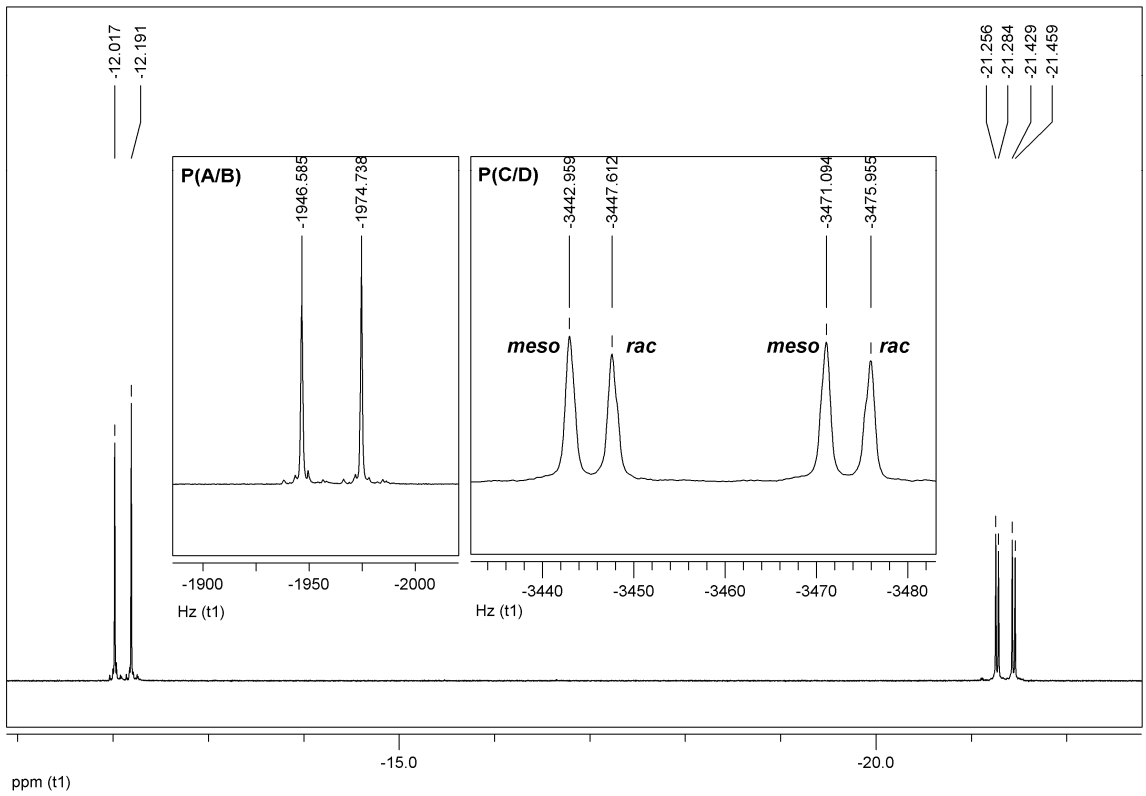

Figure S1. $^{31}P\{^{1}H\}$-NMR spectra (161.975 MHz, benzene-d_6, 300 K) of *meso-/rac*-prP_4 (1,1,4,8,11,11-hexaphenyl-1,4,8,11-tetraphosphaundecane).

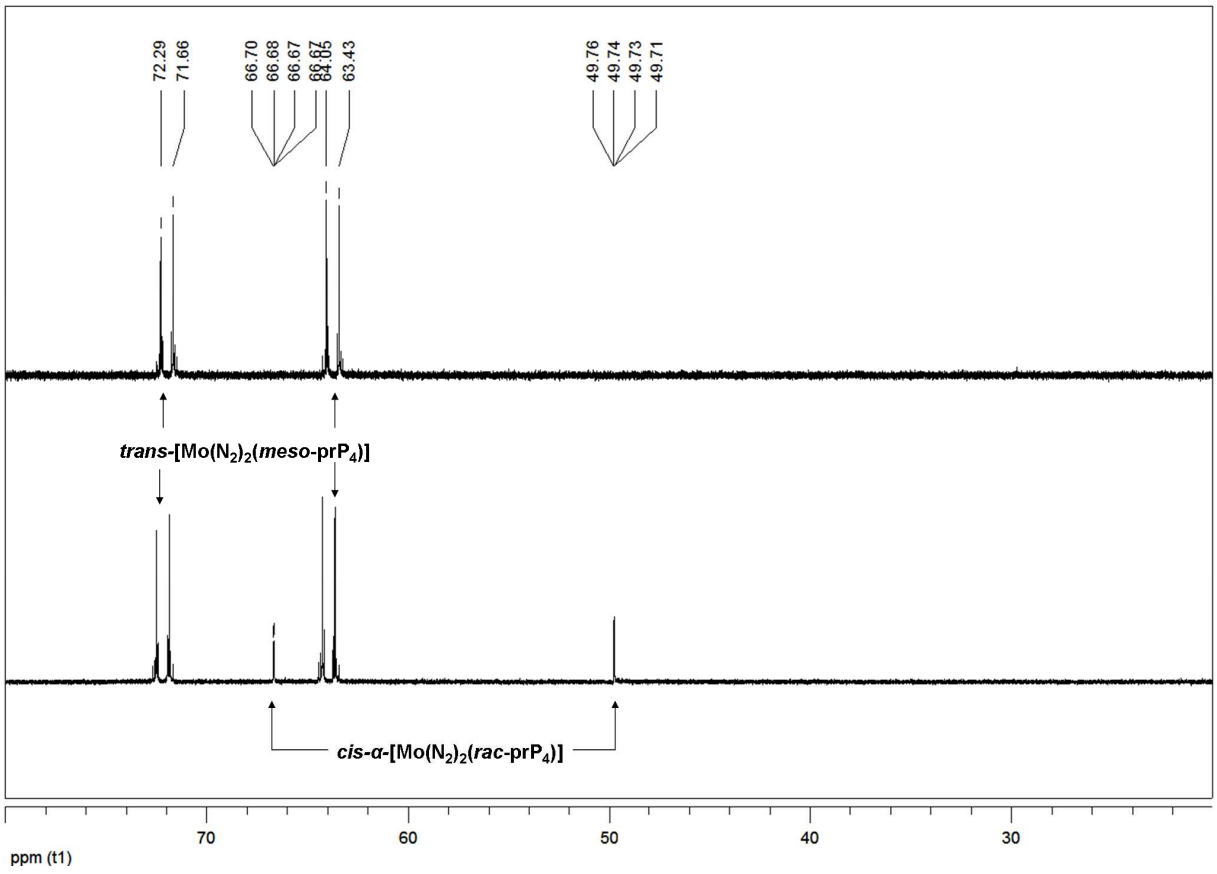

Figure S2. $^{31}P\{^{1}H\}$-NMR spectra (161.975 MHz, benzene-d_6, 300 K) of the pure *trans*-[$Mo(N_2)_2$(*meso*-prP_4)] from the electrochemical reduction of [Mo(O)I(*meso*-prP_4)]BPh_4 (top) and of the mixture of *trans* -[$Mo(N_2)_2$(*meso*-prP_4)] and *cis*-α-[$Mo(N_2)_2$(*rac*-prP_4)] from the reduction with Mg (bottom).

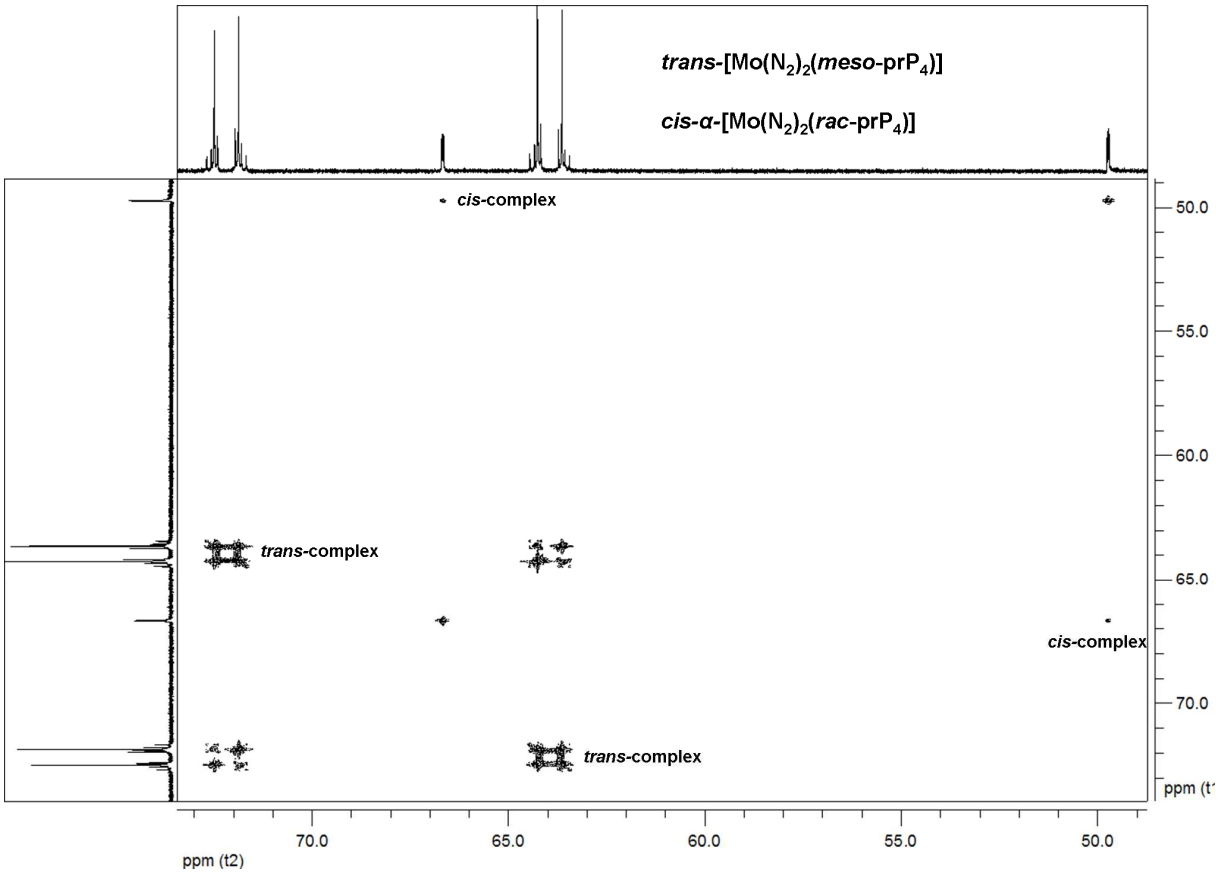

Figure S3. ^{31}P-$^{31}P\{^{1}H\}$-COSY-NMR spectra (161.975 MHz, benzene-d_6, 300 K) of the mixture of *trans*-[$Mo(N_2)_2$(*meso*-prP_4)] and *cis*-α-[$Mo(N_2)_2$(*rac*-prP_4)].

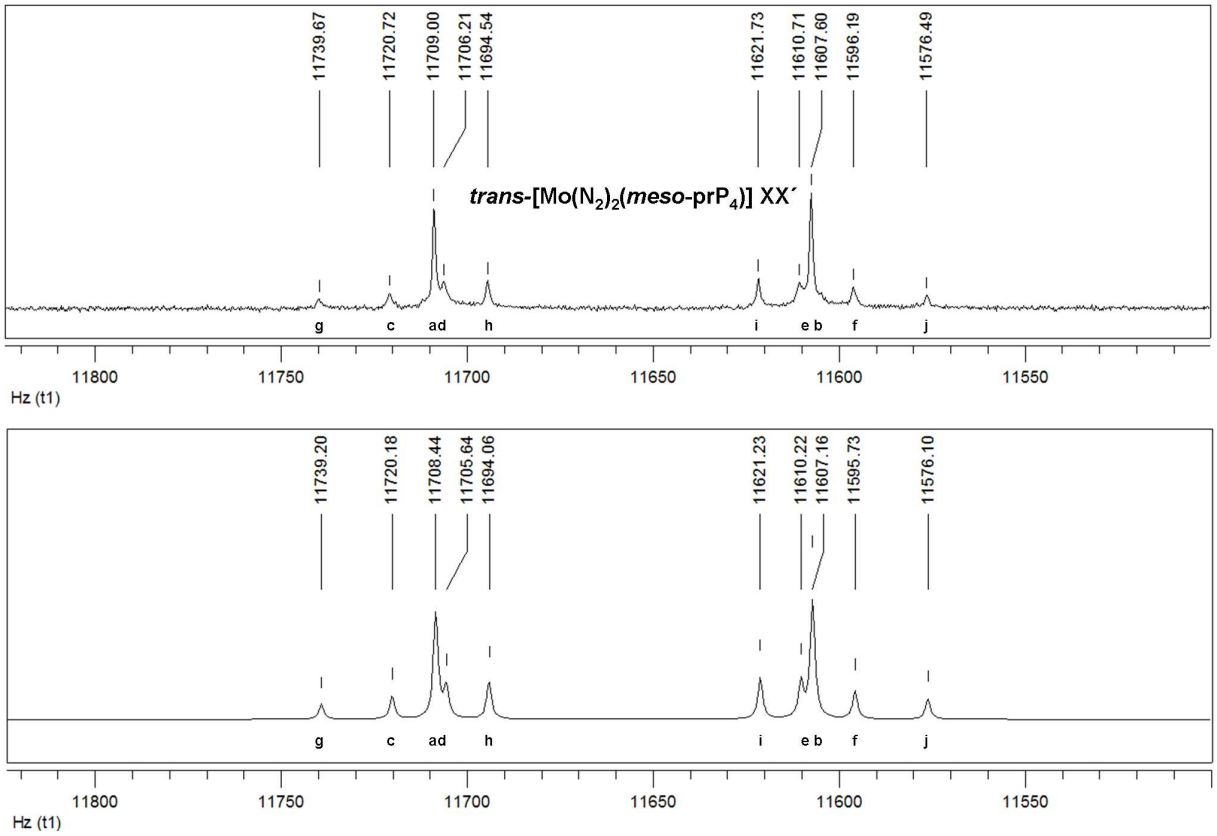

Figure S4. $^{31}P\{^{1}H\}$-NMR-spectra (161.975 MHz, benzene-d_6, 300 K) XX´-half spectra of *trans*-[$Mo(N_2)_2$(*meso*-prP_4)] measured (top) and simulated (bottom).

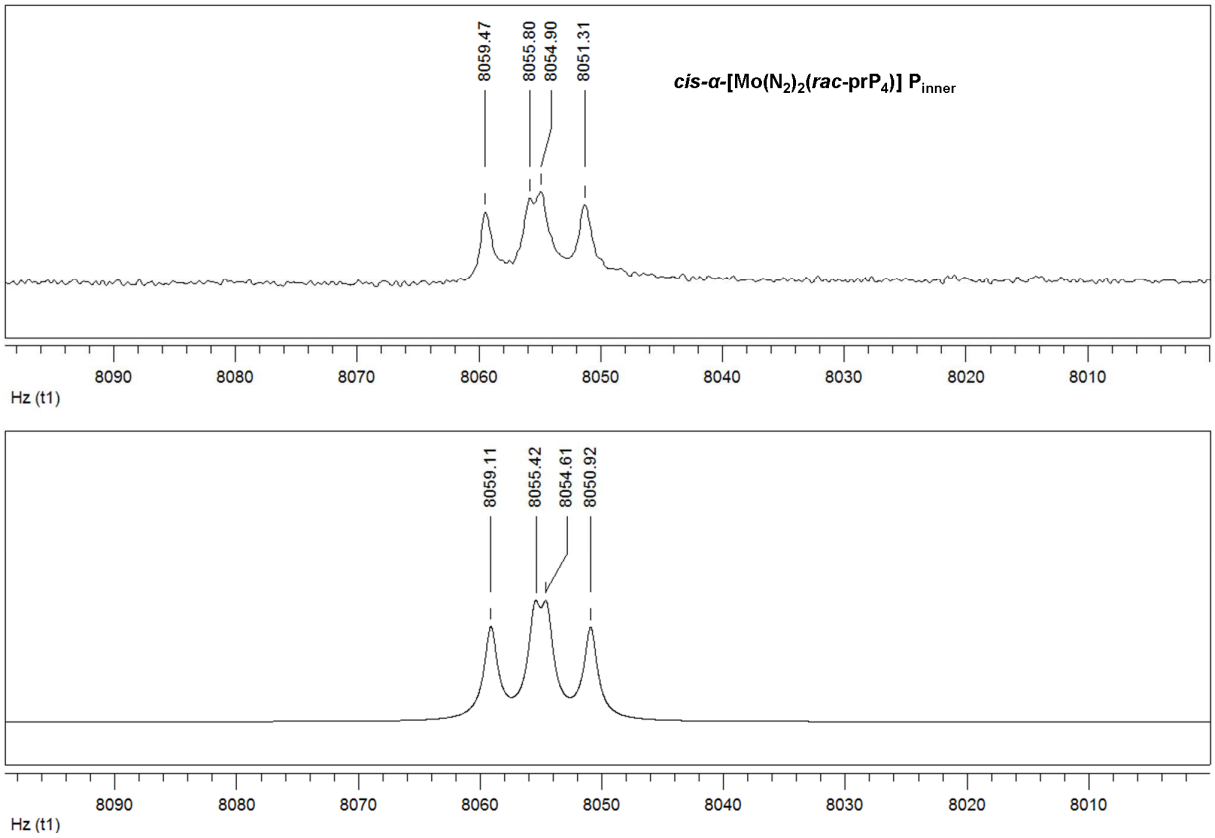

Figure S5. $^{31}P\{^{1}H\}$-NMR-spectra (161.975 MHz, benzene-d_6, 300 K) half spectra of *cis*-α-[$Mo(N_2)_2$(*rac*-prP_4)] measured (top) and simulated (bottom).

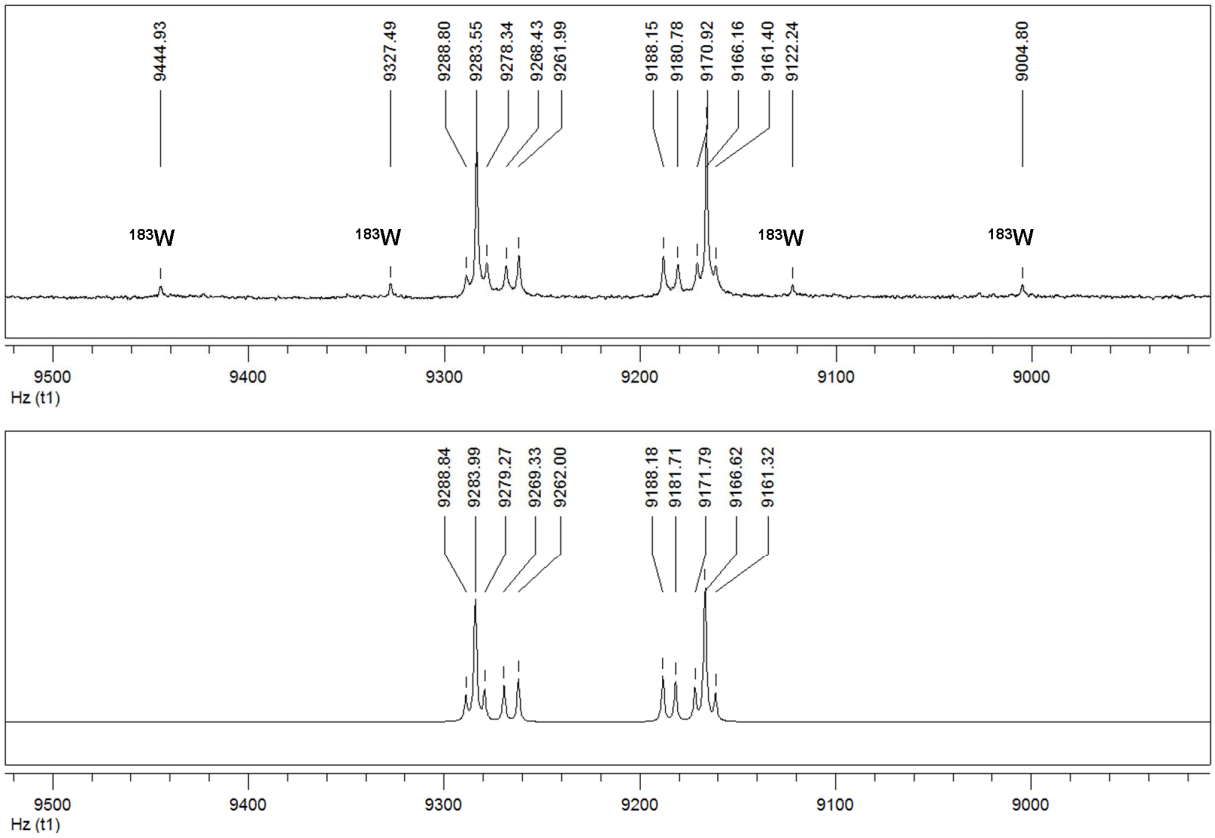

Figure S6. $^{31}P\{^{1}H\}$-NMR-spectra (161.975 MHz, benzene-d_6, 300 K) XX´-half spectra of *trans*-[$W(N_2)_2$(*meso*-prP_4)] measured (top) and simulated (bottom).

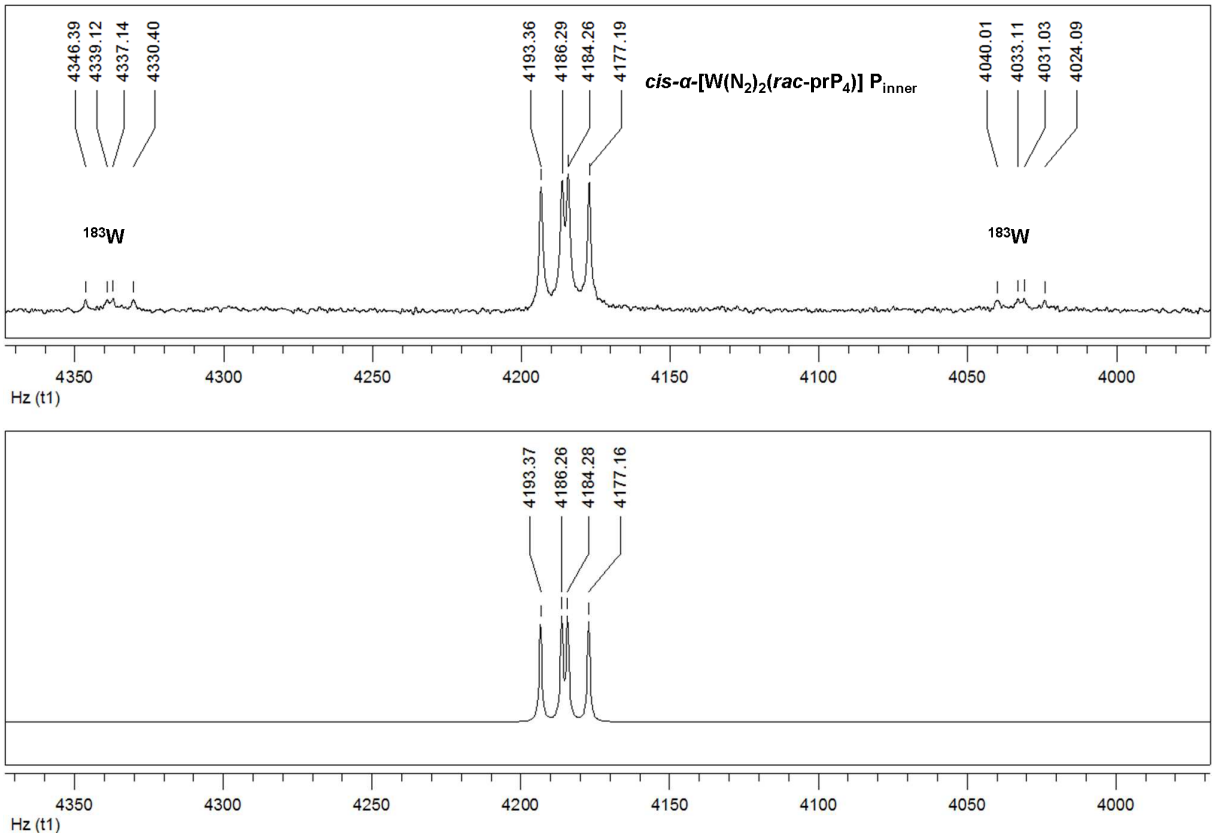

Figure S7. $^{31}P\{^{1}H\}$-NMR-spectra (161.975 MHz, benzene-d_6, 300 K) half spectra of *cis*-α-[$W(N_2)_2$(*rac*-prP_4)] measured (top) and simulated (bottom).

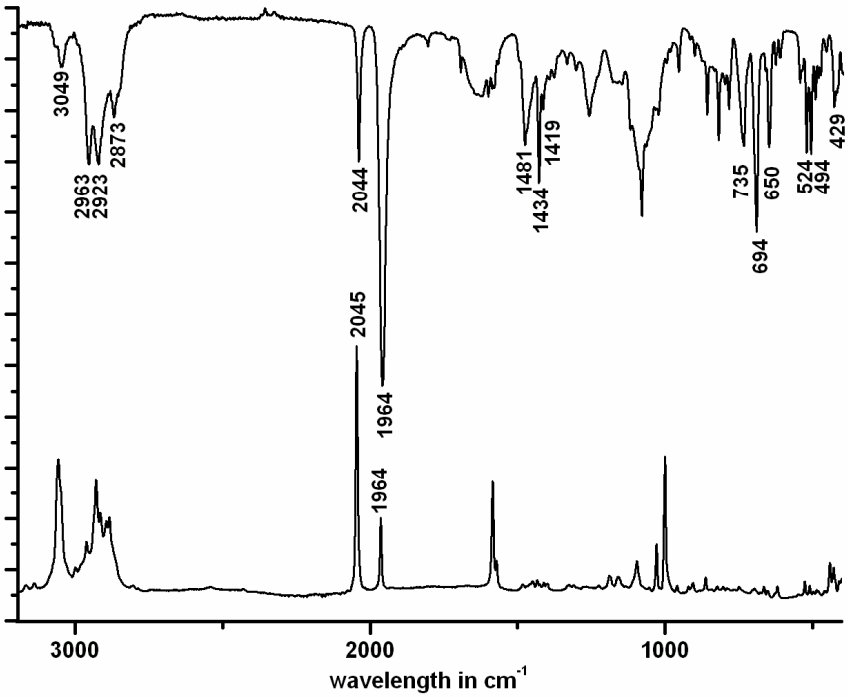

Figure S8 IR-and Raman-spectra of *trans*-[Mo$(N_2)_2$(*meso*-prP_4)].

	trans-[W$(N_2)_2$(prP_4)]	*trans*-[Mo$(N_2)_2$(*meso*-prP_4)]	[Mo(O)I(*meso*-prP_4)]$^+$
$^{2/4}J_{AA'}$	18.3 Hz	-29.9 Hz	-28.4 Hz
$^{2}J_{XX'}$	-8.4 Hz	-15.3 Hz	-18.1 Hz
$^{2/3}J_{AX'/A'X}$	107.2 Hz	105.1 Hz	108.6 Hz
$\lvert^{2/3}J_{AX/A'X'}\rvert$	10.1 Hz	3.7 Hz	4.7 Hz

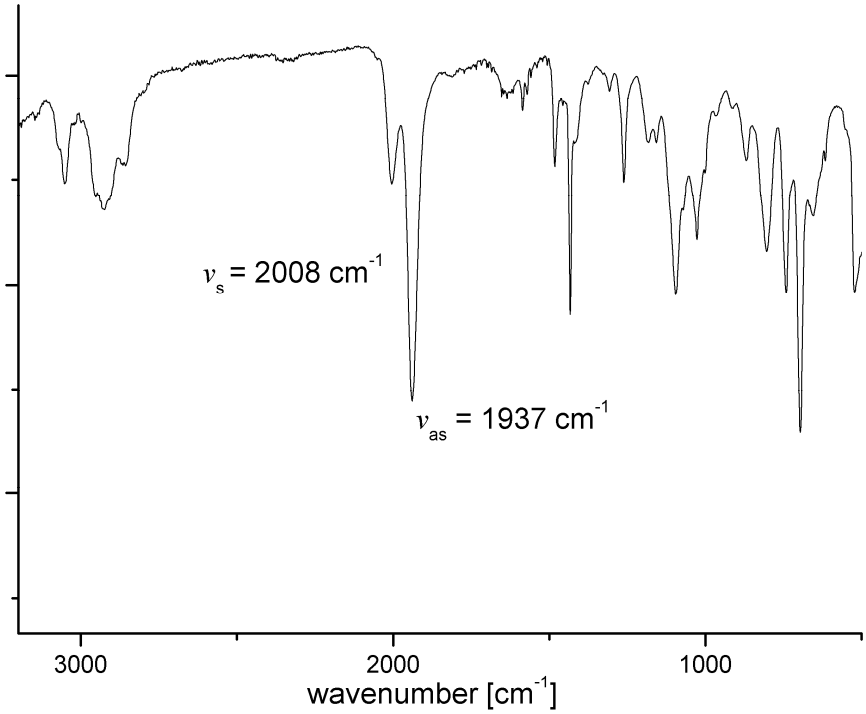

Figure S9 IR-spectrum of *cis*-α/*trans*-[$W(N_2)_2$(rac/*meso*-prP_4)].

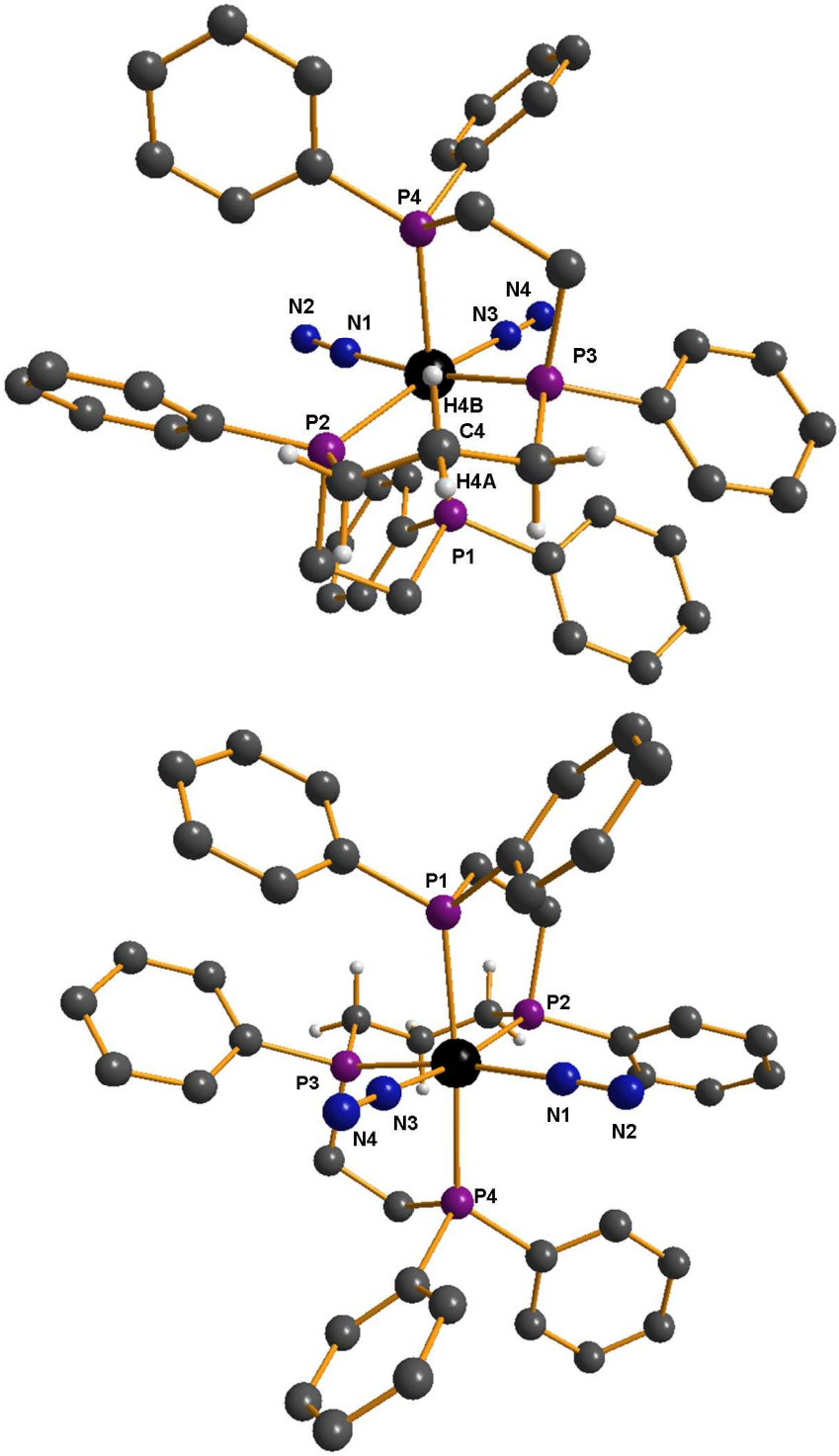

Figure S10. Crystal structure of *cis*-α-[Mo(N_2)$_2$(*rac*-prP_4)] with the disordered *β*-C of the propylene bridge

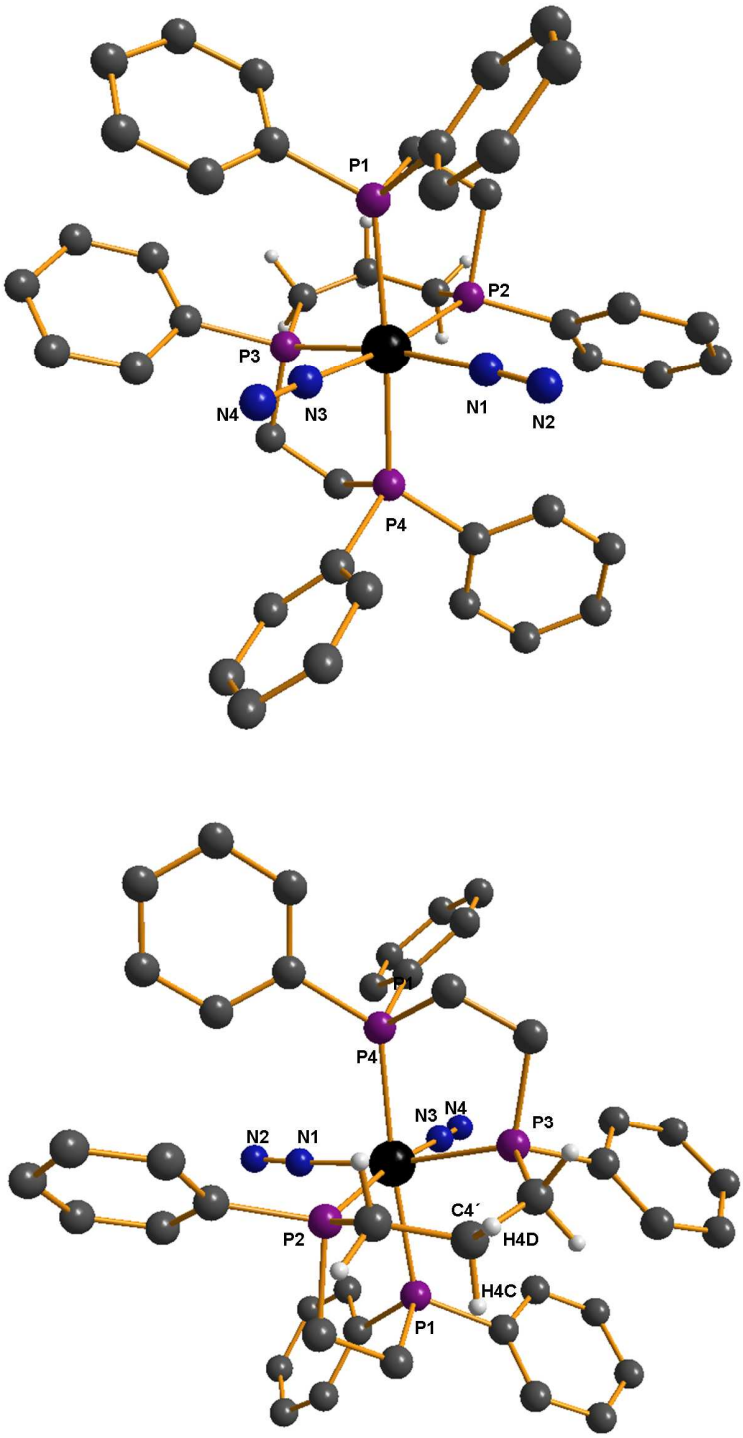

Figure S11. Crystal structure of *cis*-α-[Mo(N_2)$_2$(*rac*-prP_4)] with the disordered *β*-C of the propylene bridge.

Table 1. Crystal data and structure refinement for *cis*-α-[$Mo(N_2)_2$(*rac*-prP_4)].

Identification code	*cis*-α-[$Mo(N_2)_2$(*rac*-prP_4)]	
Empirical formula	$C_{43}H_{44}MoN_4P_4$	
Formula weight	836.64	
Temperature	170(2) K	
Wavelength	0.71073 Å	
Crystal system	triclinic	
Space group	P-1	
Unit cell dimensions	a = 9.4885(8) Å	α= 92.688(11)°.
	b = 11.4201(11) Å	β= 90.529(10)°.
	c = 19.3015(17) Å	γ = 112.629(10)°.
Volume	1927.5(3) $Å^3$	
Z	2	
Density (calculated)	1.442 Mg/m^3	
Absorption coefficient	0.544 mm^{-1}	
F(000)	864	
Crystal size	0.3 x 0.1 x 0.1 mm^3	
Theta range for data collection	2.15 to 26.02°.	
Index ranges	-11<=h<=11, -14<=k<=14, -23<=l<=23	
Reflections collected	14373	
Independent reflections	7286 [R(int) = 0.0449]	
Completeness to theta = 26.02°	95.8 %	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	7286 / 2 / 474	
Goodness-of-fit on F^2	1.141	
Final R indices [I>2sigma(I)]	R1 = 0.0725, wR2 = 0.1884	
R indices (all data)	R1 = 0.0952, wR2 = 0.2007	
Largest diff. peak and hole	2.497 and -1.133 e.$Å^{-3}$	

Remarks:
All non-hydrogen were refined anisotropic. The C-H H atoms were positioned with idealized geometry and were refined using a riding model.
The crystal investigated was slightly twinned with a pseudo 2-fold axis as twinning element. The low reliability factors can be regarded to the low crystallinity and the twinning of the crystals.

Table 2. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters (Å^{2}x 10^3). U(eq) is defined as one third of the trace of the orthogonalized U_{ij} tensor.

	x	y	z	U(eq)
Mo(1)	3334(1)	4765(1)	7473(1)	13(1)
N(1)	1363(8)	3880(6)	6898(3)	19(1)
N(2)	235(9)	3397(7)	6617(4)	31(2)
N(3)	2139(7)	5606(6)	8048(3)	18(1)
N(4)	1446(9)	6036(7)	8341(4)	31(2)
P(1)	4332(2)	6604(2)	6737(1)	15(1)
P(2)	4824(2)	4015(2)	6660(1)	16(1)
P(3)	5531(2)	5577(2)	8263(1)	16(1)
P(4)	2627(2)	3029(2)	8263(1)	15(1)
C(1)	5889(9)	6475(8)	6199(4)	23(2)
C(2)	5425(10)	5106(8)	5935(4)	26(2)
C(3)	6714(10)	4034(9)	6906(5)	35(2)
C(4)	7413(12)	4463(10)	7608(5)	20(2)
C(4')	7790(30)	5100(30)	7316(17)	47(10)
C(5)	7412(9)	5702(9)	7954(5)	33(2)
C(6)	5320(10)	4512(8)	8992(4)	24(2)
C(7)	4329(9)	3132(8)	8775(4)	24(2)
C(11)	5219(9)	8265(7)	7086(4)	21(2)
C(12)	4527(10)	8648(8)	7616(5)	29(2)
C(13)	5131(11)	9909(8)	7894(5)	34(2)
C(14)	6482(11)	10769(8)	7646(5)	36(2)
C(15)	7183(11)	10375(9)	7117(6)	44(3)
C(16)	6531(11)	9136(9)	6831(6)	41(2)
C(21)	2956(9)	6716(7)	6088(4)	17(2)
C(22)	1486(10)	6501(8)	6293(5)	29(2)
C(23)	376(10)	6542(9)	5841(5)	36(2)
C(24)	713(12)	6785(9)	5150(5)	37(2)
C(25)	2152(12)	6985(9)	4932(4)	34(2)
C(26)	3275(10)	6967(8)	5391(4)	26(2)
C(31)	3960(9)	2514(8)	6127(4)	22(2)
C(32)	4348(11)	1467(8)	6154(5)	32(2)
C(33)	3648(13)	375(9)	5728(6)	45(3)
C(34)	2498(13)	323(9)	5261(5)	45(3)
C(35)	2044(11)	1324(9)	5234(5)	37(2)
C(36)	2753(10)	2419(8)	5655(4)	28(2)
C(41)	6006(9)	7097(7)	8766(4)	17(2)
C(42)	7311(10)	8172(8)	8675(5)	27(2)
C(43)	7610(12)	9281(9)	9065(5)	38(2)
C(44)	6571(13)	9355(9)	9561(5)	40(2)
C(45)	5244(12)	8326(9)	9642(4)	34(2)
C(46)	4948(10)	7211(8)	9248(4)	25(2)
C(51)	1253(9)	3063(7)	8928(4)	18(2)
C(52)	1574(11)	3182(10)	9648(4)	35(2)
C(53)	489(11)	3244(12)	10109(5)	47(3)
C(54)	-907(11)	3192(9)	9886(5)	35(2)
C(55)	-1247(10)	3047(9)	9169(5)	32(2)
C(56)	-155(10)	3008(8)	8714(4)	25(2)
C(61)	1841(9)	1308(7)	8017(4)	20(2)
C(62)	1684(10)	427(8)	8515(5)	32(2)
C(63)	1185(11)	-867(9)	8319(6)	38(2)
C(64)	807(11)	-1266(8)	7627(6)	44(3)
C(65)	904(11)	-404(9)	7139(6)	39(2)
C(66)	1422(10)	885(8)	7330(5)	30(2)

Table 3. Bond lengths [Å] and angles [°].

Mo(1)-N(1)	2.037(7)	Mo(1)-P(4)	2.4463(19)
Mo(1)-N(3)	2.050(6)	Mo(1)-P(2)	2.4566(19)
Mo(1)-P(3)	2.420(2)	Mo(1)-P(1)	2.469(2)
N(1)-N(2)	1.119(10)	N(3)-N(4)	1.106(9)
N(1)-Mo(1)-N(3)	86.2(3)	P(3)-Mo(1)-P(2)	89.21(7)
N(1)-Mo(1)-P(3)	172.02(17)	P(4)-Mo(1)-P(2)	98.60(7)
N(3)-Mo(1)-P(3)	93.08(19)	N(1)-Mo(1)-P(1)	94.70(17)
N(1)-Mo(1)-P(4)	91.53(18)	N(3)-Mo(1)-P(1)	91.51(17)
N(3)-Mo(1)-P(4)	90.14(17)	P(3)-Mo(1)-P(1)	93.27(7)
P(3)-Mo(1)-P(4)	80.52(7)	P(4)-Mo(1)-P(1)	173.65(7)
N(1)-Mo(1)-P(2)	92.73(18)	P(2)-Mo(1)-P(1)	79.89(6)
N(3)-Mo(1)-P(2)	171.22(17)		
N(2)-N(1)-Mo(1)	175.8(6)	C(2)-P(2)-Mo(1)	109.2(3)
N(4)-N(3)-Mo(1)	177.3(7)	C(31)-P(2)-Mo(1)	122.2(3)
C(11)-P(1)-Mo(1)	123.6(3)	C(7)-P(4)-Mo(1)	109.7(3)
C(21)-P(1)-Mo(1)	115.3(2)	C(61)-P(4)-Mo(1)	126.7(3)
C(1)-P(1)-Mo(1)	109.6(3)	C(51)-P(4)-Mo(1)	115.0(2)
C(3)-P(2)-Mo(1)	121.9(3)	C(41)-P(3)-Mo(1)	120.9(3)
C(6)-P(3)-Mo(1)	111.4(3)	C(5)-P(3)-Mo(1)	119.5(3)
P(1)-C(11)	1.844(8)	P(3)-C(41)	1.841(7)
P(1)-C(21)	1.845(8)	P(3)-C(5)	1.843(8)
P(1)-C(1)	1.861(8)	P(3)-C(6)	1.865(8)
P(2)-C(3)	1.843(9)	P(4)-C(7)	1.847(8)
P(2)-C(31)	1.846(8)	P(4)-C(61)	1.849(8)
P(2)-C(2)	1.862(8)	P(4)-C(51)	1.849(8)
C(1)-C(2)	1.513(11)	C(4)-C(5)	1.537(12)
C(3)-C(4')	1.45(2)	C(4')-C(5)	1.50(2)
C(3)-C(4)	1.478(13)	C(6)-C(7)	1.527(11)

Table 3. Bond lengths [Å] and angles [°].

C(11)-C(12)	1.365(12)	C(41)-C(42)	1.388(11)
C(11)-C(16)	1.373(12)	C(41)-C(46)	1.412(10)
C(12)-C(13)	1.405(12)	C(42)-C(43)	1.372(12)
C(13)-C(14)	1.387(14)	C(43)-C(44)	1.402(14)
C(14)-C(15)	1.374(15)	C(44)-C(45)	1.369(15)
C(15)-C(16)	1.391(14)	C(45)-C(46)	1.382(12)
C(21)-C(22)	1.385(11)	C(51)-C(56)	1.372(12)
C(21)-C(26)	1.400(10)	C(51)-C(52)	1.408(11)
C(22)-C(23)	1.378(13)	C(52)-C(53)	1.387(13)
C(23)-C(24)	1.389(14)	C(53)-C(54)	1.368(15)
C(24)-C(25)	1.369(14)	C(54)-C(55)	1.406(13)
C(25)-C(26)	1.386(12)	C(55)-C(56)	1.375(11)
C(31)-C(32)	1.383(12)	C(61)-C(66)	1.391(12)
C(31)-C(36)	1.425(12)	C(61)-C(62)	1.392(12)
C(32)-C(33)	1.389(13)	C(62)-C(63)	1.399(13)
C(33)-C(34)	1.390(16)	C(63)-C(64)	1.389(16)
C(34)-C(35)	1.371(15)	C(64)-C(65)	1.373(15)
C(35)-C(36)	1.386(12)	C(65)-C(66)	1.391(12)
C(11)-P(1)-C(21)	101.3(3)	C(22)-C(23)-C(24)	119.8(9)
C(11)-P(1)-C(1)	101.2(4)	C(25)-C(24)-C(23)	119.1(8)
C(21)-P(1)-C(1)	103.3(4)	C(24)-C(25)-C(26)	121.0(8)
C(3)-P(2)-C(31)	102.7(4)	C(25)-C(26)-C(21)	120.8(8)
C(3)-P(2)-C(2)	98.1(4)	C(32)-C(31)-C(36)	117.1(8)
C(31)-P(2)-C(2)	97.6(4)	C(32)-C(31)-P(2)	126.3(7)
C(41)-P(3)-C(5)	102.2(4)	C(36)-C(31)-P(2)	116.6(6)
C(41)-P(3)-C(6)	99.3(3)	C(31)-C(32)-C(33)	122.6(9)
C(5)-P(3)-C(6)	99.9(4)	C(32)-C(33)-C(34)	118.9(9)
C(7)-P(4)-C(61)	99.2(4)	C(35)-C(34)-C(33)	120.4(9)
C(7)-P(4)-C(51)	103.7(4)	C(34)-C(35)-C(36)	120.7(10)
C(61)-P(4)-C(51)	99.5(3)	C(35)-C(36)-C(31)	120.3(9)
C(2)-C(1)-P(1)	108.6(5)	C(42)-C(41)-C(46)	117.3(7)
C(1)-C(2)-P(2)	110.9(5)	C(42)-C(41)-P(3)	123.9(6)
C(4')-C(3)-C(4)	36.0(18)	C(46)-C(41)-P(3)	118.7(6)
C(4')-C(3)-P(2)	120.2(17)	C(43)-C(42)-C(41)	121.5(8)
C(4)-C(3)-P(2)	122.4(7)	C(42)-C(43)-C(44)	120.0(9)
C(3)-C(4)-C(5)	119.8(8)	C(45)-C(44)-C(43)	119.7(8)
C(3)-C(4')-C(5)	124.8(19)	C(44)-C(45)-C(46)	120.0(9)
C(4')-C(5)-C(4)	34.6(17)	C(45)-C(46)-C(41)	121.3(8)
C(4')-C(5)-P(3)	129.2(13)	C(56)-C(51)-C(52)	117.3(7)
C(4)-C(5)-P(3)	113.9(6)	C(56)-C(51)-P(4)	118.6(6)
C(7)-C(6)-P(3)	111.6(5)	C(52)-C(51)-P(4)	124.0(6)
C(6)-C(7)-P(4)	110.9(6)	C(53)-C(52)-C(51)	120.0(9)
C(12)-C(11)-C(16)	118.6(8)	C(54)-C(53)-C(52)	121.8(9)
C(12)-C(11)-P(1)	118.3(6)	C(53)-C(54)-C(55)	118.4(8)
C(16)-C(11)-P(1)	123.1(7)	C(56)-C(55)-C(54)	119.4(9)
C(11)-C(12)-C(13)	121.0(8)	C(51)-C(56)-C(55)	123.0(8)
C(14)-C(13)-C(12)	119.8(9)	C(66)-C(61)-C(62)	119.4(8)
C(15)-C(14)-C(13)	118.9(8)	C(66)-C(61)-P(4)	120.2(6)
C(14)-C(15)-C(16)	120.2(9)	C(62)-C(61)-P(4)	120.5(7)
C(11)-C(16)-C(15)	121.4(9)	C(61)-C(62)-C(63)	120.2(9)
C(22)-C(21)-C(26)	117.1(7)	C(64)-C(63)-C(62)	119.4(9)
C(22)-C(21)-P(1)	118.2(6)	C(65)-C(64)-C(63)	120.5(9)
C(26)-C(21)-P(1)	124.7(6)	C(64)-C(65)-C(66)	120.2(10)
C(23)-C(22)-C(21)	122.3(8)	C(65)-C(66)-C(61)	120.2(9)

Table 4. Anisotropic displacement parameters ($Å^2 x\ 10^3$). The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2\ a^{*2}U_{11} + ... + 2\ h\ k\ a^*\ b^*\ U_{12}\ ]$

	U_{11}	U_{22}	U_{33}	U_{23}	U_{13}	U_{12}
Mo(1)	14(1)	17(1)	8(1)	2(1)	2(1)	7(1)
N(1)	27(4)	22(3)	10(3)	6(2)	5(3)	10(3)
N(2)	27(4)	36(4)	26(4)	3(3)	-5(3)	6(3)
N(3)	22(3)	21(3)	11(3)	5(2)	5(3)	8(3)
N(4)	35(4)	25(4)	35(4)	7(3)	10(3)	15(3)
P(1)	16(1)	20(1)	11(1)	3(1)	3(1)	8(1)
P(2)	19(1)	22(1)	10(1)	0(1)	1(1)	11(1)
P(3)	15(1)	19(1)	12(1)	-1(1)	2(1)	6(1)
P(4)	17(1)	18(1)	11(1)	3(1)	2(1)	7(1)
C(1)	21(4)	28(4)	23(4)	7(3)	7(3)	12(3)
C(2)	30(5)	31(4)	21(4)	4(3)	12(3)	15(4)
C(3)	24(5)	42(5)	48(6)	-16(4)	-6(4)	24(4)
C(4)	21(5)	32(6)	18(5)	-2(4)	2(4)	21(5)
C(5)	11(4)	36(5)	43(5)	-22(4)	1(4)	3(3)
C(6)	23(4)	33(4)	16(4)	6(3)	-7(3)	10(3)
C(7)	23(4)	24(4)	25(4)	8(3)	2(3)	9(3)
C(11)	24(4)	22(4)	19(4)	1(3)	-5(3)	9(3)
C(12)	26(5)	26(4)	32(5)	4(3)	4(4)	6(3)
C(13)	42(6)	26(5)	35(5)	-3(4)	2(4)	14(4)
C(14)	31(5)	18(4)	58(6)	-1(4)	-14(4)	10(4)
C(15)	23(5)	31(5)	66(7)	3(5)	5(5)	-2(4)
C(16)	35(5)	29(5)	48(6)	-1(4)	17(5)	3(4)
C(21)	25(4)	14(3)	13(3)	0(3)	-1(3)	10(3)
C(22)	20(4)	35(5)	30(4)	6(4)	0(3)	11(4)
C(23)	15(4)	42(5)	50(6)	11(4)	1(4)	10(4)
C(24)	39(6)	43(6)	34(5)	-3(4)	-13(4)	20(4)
C(25)	51(6)	47(6)	13(4)	-3(4)	-10(4)	28(5)
C(26)	35(5)	37(5)	13(4)	-1(3)	0(3)	24(4)
C(31)	25(4)	30(4)	12(3)	2(3)	2(3)	13(3)
C(32)	46(6)	27(4)	26(4)	-3(3)	5(4)	19(4)
C(33)	60(7)	21(5)	53(6)	-5(4)	11(5)	15(5)
C(34)	55(7)	32(5)	34(5)	-15(4)	2(5)	2(5)
C(35)	33(5)	37(5)	28(5)	-9(4)	-5(4)	2(4)
C(36)	33(5)	32(5)	19(4)	4(3)	0(3)	11(4)
C(41)	20(4)	22(4)	11(3)	-2(3)	0(3)	10(3)
C(42)	25(5)	25(4)	31(4)	-3(3)	0(4)	8(3)
C(43)	41(6)	21(4)	47(6)	-4(4)	-1(4)	8(4)
C(44)	57(7)	29(5)	40(5)	-11(4)	-12(5)	25(5)
C(45)	53(6)	44(5)	20(4)	-4(4)	-1(4)	36(5)
C(46)	29(5)	32(4)	17(4)	-1(3)	2(3)	14(4)
C(51)	21(4)	18(4)	15(3)	4(3)	1(3)	6(3)
C(52)	23(5)	65(7)	14(4)	2(4)	1(3)	15(4)
C(53)	30(5)	88(8)	14(4)	-4(5)	5(4)	13(5)
C(54)	31(5)	44(5)	29(5)	-2(4)	15(4)	12(4)
C(55)	23(5)	48(6)	31(5)	8(4)	6(4)	19(4)
C(56)	27(5)	40(5)	13(4)	4(3)	4(3)	16(4)
C(61)	20(4)	14(4)	25(4)	2(3)	7(3)	4(3)
C(62)	24(5)	23(4)	48(6)	12(4)	5(4)	7(3)
C(63)	33(5)	24(5)	58(6)	11(4)	10(5)	11(4)
C(64)	32(5)	17(4)	75(8)	-1(5)	24(5)	2(4)
C(65)	32(5)	30(5)	46(6)	-11(4)	9(4)	4(4)
C(66)	30(5)	24(4)	30(4)	0(3)	8(4)	5(4)

Table 5. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3).

	x	y	z	U(eq)
H(1A)	6063	7030	5804	28
H(1B)	6849	6748	6481	28
H(2A)	6296	5000	5701	31
H(2B)	4571	4885	5591	31
H(3A)	6662	3157	6818	42
H(3B)	7447	4567	6575	42
H(3C)	6540	3262	7163	42
H(3D)	7220	3945	6472	42
H(4A)	8490	4547	7587	24
H(4B)	6893	3773	7920	24
H(4C)	8234	5789	6993	56
H(4D)	8631	4839	7455	56
H(5A)	7766	6376	7618	39
H(5B)	8152	5963	8353	39
H(5C)	8008	6624	7925	39
H(5D)	7885	5433	8343	39
H(6A)	6342	4570	9149	29
H(6B)	4852	4798	9387	29
H(7A)	4002	2639	9194	29
H(7B)	4935	2757	8495	29
H(12)	3624	8054	7801	35
H(13)	4614	10171	8250	41
H(14)	6915	11617	7839	43
H(15)	8115	10950	6946	53
H(16)	7003	8888	6452	49
H(22)	1235	6319	6762	34
H(23)	-616	6405	6001	43
H(24)	-45	6812	4834	45
H(25)	2385	7138	4459	41
H(26)	4272	7127	5231	31
H(32)	5125	1496	6476	38
H(33)	3950	-325	5755	54
H(34)	2025	-410	4959	54
H(35)	1234	1267	4923	44
H(36)	2433	3108	5628	34
H(42)	8014	8139	8334	33
H(43)	8521	10000	9000	45
H(44)	6788	10116	9839	48
H(45)	4526	8378	9969	41
H(46)	4016	6507	9302	30
H(52)	2534	3220	9818	42
H(53)	722	3324	10593	56
H(54)	-1630	3253	10208	42
H(55)	-2221	2976	9000	39
H(56)	-387	2940	8231	30
H(62)	1915	704	8989	39
H(63)	1106	-1467	8656	46
H(64)	479	-2143	7490	52
H(65)	616	-689	6669	46
H(66)	1490	1478	6990	36