# Supplementary Material (ESI) for Chemical Communications


**Anion-assisted *trans-cis* isomerization of palladium(II) phosphine complexes containing acetanilide functionalities through hydrogen bonding interactions**

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## Supplementary Information

Synthesis of $Ph_2PC_6H_4NHCOMe$

To a stirred mixture of (*p*-aminophenyl)diphenylphosphine (6.50 g, 23.4 mmol) and triethylamine (3.5 ml) in dichloromethane (50 ml), cooled in an ice-bath, was added dropwise acetyl chloride (1.84 g, 23.4 mmol) over 10 mins. Stirring continued for 3 hours at this temperature and the resulting mixture was evaporated in vacuo and partitioned between ethyl acetate and water. The organic layer was washed with water and saturated brine solution, dried over anhydrous $MgSO_4$ and evaporated to dryness. The residue was dissolved in chloroform and purified by column chromatography on silica gel, using chloroform as eluent. Yield 5.00 g, 67%. $^1$H NMR (400 MHz, $CDCl_3$, 298 K, relative to $Me_4Si$): δ 2.22 (s, 3H, $COCH_3$), 7.13 (s, br, 1H, NH), 7.28-7.34 (m, 12H, phenyl protons), 7.49-7.52 (d, $J$ = 8.1 Hz, 2H, phenyl protons). $^{31}$P{$^1$H} NMR (202 MHz, $CDCl_3$, 298 K, relative to 85 % $H_3PO_4$): δ –6.22 (s). Positive-ion FAB-MS: m/z 319 $\{M\}^+$. Anal. Found: C 75.17, H 5.69, N 4.42; Calcd for $C_{20}H_{18}NOP$: C 75.22, H 5.68, N 4.39.

Synthesis of $Ph_2PC_6H_4NMeCOMe$

This reaction was carried out using standard Schlenk technique. To a mixture of *N*-methyl-4-iodoacetanilide (2.75 g, 10 mmol) and $PdCl_2(MeCN)_2$ (65 mg, 0.25 mmol) in benzene (200 ml), was added dropwise via syringe (trimethylsily)diphenylphosphine (2.71 g, 10.5 mmol) over 10 mins. The resulting mixture was heated at 65 °C for 24 hours. After cooling, the benzene was evaporated in vacuo and chloroform added. The organic layer was washed with saturated sodium bicarbonate and saturated brine solution, dried over anhydrous $MgSO_4$ and evaporated to dryness. The residue was dissolved in chloroform and purified by column chromatography on silica gel, using chloroform as eluent. Yield 2.16 g, 65 %. $^1$H NMR (400 MHz, $CDCl_3$, 298 K, relative to $Me_4Si$): δ 1.90 (s, 3H, $COCH_3$), 3.27 (s, 3H, $NCH_3$), 7.14-7.16 (d, $J$ = 7.8, 2H, phenyl H ortho to N) 7.30-7.37 (m, 12H, phenyl protons). $^{31}P\{^1H\}$ NMR (202 MHz, $CDCl_3$, 298 K, relative to 85% $H_3PO_4$): δ –5.80 (s). Positive-ion FAB-MS: m/z 333 $\{M\}^+$. Anal. Found: C 75.61, H 6.07, N 4.22; Calcd for $C_{21}H_{20}NOP$: C 75.66, H 6.05, N 4.20.

Characterization of $[Pd(Ph_2PC_6H_4NHCOMe)_2Cl_2]$ (**1**)

Yield: 363 mg, 89 %. $^1$H NMR (400 MHz, $CDCl_3$, 298 K, relative to $Me_4Si$): δ 1.74 (s, 6H, $COCH_3$), 7.37-7.46 (m, 16H, phenyl protons) 7.61-7.63 (m, 12H, phenyl protons). $^{31}P\{^1H\}$ NMR (202 MHz, $CDCl_3$, 298 K, relative to 85% $H_3PO_4$): δ 23.36 (s). Positive-ion FAB-MS: m/z 816 $\{M\}^+$, 780 $\{M–Cl\}^+$. Anal. Found: C 58.90, H 4.47, N 3.41; Calcd. for $C_{40}H_{36}Cl_2N_2O_2P_2Pd$: C 58.88, H 4.45, N 3.43.

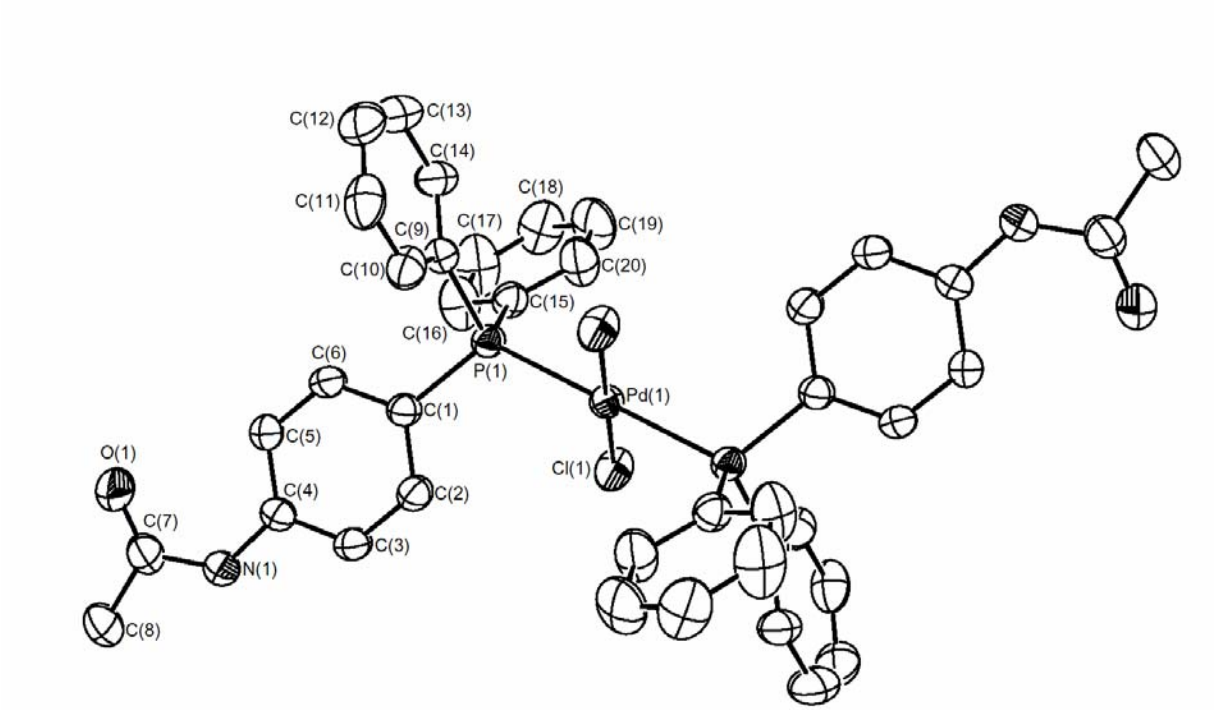
Characterization of $[Pd(Ph_2PC_6H_4NMeCOMe)_2Cl_2]$ (**2**)

Yield: 384 mg, 91 %. $^1$H NMR (400 MHz, $CDCl_3$, 298 K, relative to $Me_4Si$): δ 1.92 (s, 6H, $COCH_3$), 3.27 (s, 6H, $NCH_3$), 7.19-7.21 (d, $J$ = 7.3 Hz, 4H, phenyl H ortho to N), 7.41-7.67 (m, 24 H, phenyl protons). $^{31}P\{^1H\}$ NMR (202 MHz, $CDCl_3$, 298 K, relative to 85% $H_3PO_4$): δ 23.13 (s). Positive-ion FAB-MS: m/z 844 $\{M\}^+$, 808 $\{M\text{-}Cl\}^+$. Anal. Found: C 59.72, H 4.80, N 3.34; Calcd. for $C_{42}H_{40}Cl_2N_2O_2P_2Pd$: C 59.76, H 4.78, N 3.32.

## Crystal data for $[Pd(Ph_2PC_6H_4NHCOMe)_2Cl_2]$ (1)

Table 1. Crystal data and structure refinement.

| | | |
|---|---|---|
| Empirical formula | $C_{72}\ H_{108}\ Cl_4\ N_4\ O_2\ P_2\ Pd$ | |
| Formula weight | 1371.76 | |
| Temperature | 301(2) K | |
| Wavelength | 0.71073 Å | |
| Crystal system | Monoclinic | |
| Space group | $P\ 2_1/n$ | |
| Unit cell dimensions | a = 13.641(3) Å | α = 90° |
| | b = 18.267(4) Å | β = 92.42(3)° |
| | c = 15.156(3) Å | γ = 90° |
| Volume | 3773.2(14) $Å^3$ | |
| Z | 2 | |
| Density (calculated) | 1.207 $gcm^{-3}$ | |
| Absorption coefficient | 0.473 $mm^{-1}$ | |
| F(000) | 1456 | |
| Crystal size | 0.4 mm × 0.25 mm × 0.2 mm | |
| Theta range for data collection | 1.86 to 25.35° | |
| Index ranges | $-13 \le h \le 15, -22 \le k \le 22, -17 \le l \le 17$ | |
| Reflections collected | 16043 | |
| Independent reflections | 5926 [R(int) = 0.0472] | |
| Completeness to theta = 25.35° | 85.8 % | |
| Absorption correction | None | |
| Refinement method | Full-matrix least-squares on $F^2$ | |
| Data / restraints / parameters | 5926 / 0 / 394 | |
| Goodness-of-fit on $F^2$ | 0.922 | |
| Final R indices [I>2σ(I)] | R1 = 0.0427, wR2 = 0.1177 | |
| R indices (all data) | R1 = 0.0723, wR2 = 0.1329 | |
| Largest diff. peak and hole | 0.457 and -0.511 $eÅ^{-3}$ | |




Perspective drawing of $[Pd(Ph_2PC_6H_4NHCOMe)_2Cl_2]$ (**1**) with atomic numbering scheme. Hydrogen atoms are omitted for clarity.

Table 2. Atomic coordinates ( x $10^4$) and equivalent isotropic displacement parameters ($Å^2$x $10^3$) for mar1109. U (eq) is defined as one third of the trace of the orthogonalized $U^{ij}$ tensor.

| | x | y | z | U(eq) |
|---|---|---|---|---|
| Pd(1) | 0 | 0 | 10000 | 52(1) |
| Cl(1) | 1072(1) | -962(1) | 10210(1) | 76(1) |
| Cl(2) | -762(1) | -4155(1) | 8197(1) | 79(1) |
| P(1) | 331(1) | -59(1) | 8498(1) | 54(1) |
| O(1) | -866(3) | -2603(2) | 5240(2) | 123(2) |
| N(1) | -885(3) | -2864(2) | 6695(2) | 71(1) |
| N(2) | -3851(3) | -1477(2) | 5581(2) | 78(1) |
| C(1) | -129(3) | -878(2) | 7941(2) | 55(1) |
| C(2) | -415(3) | -1489(2) | 8411(2) | 65(1) |
| C(3) | -684(3) | -2128(2) | 7985(2) | 67(1) |
| C(4) | -665(3) | -2186(2) | 7070(2) | 59(1) |
| C(5) | -414(3) | -1572(2) | 6600(2) | 69(1) |
| C(6) | -167(3) | -931(2) | 7031(2) | 66(1) |
| C(7) | -954(4) | -3045(2) | 5822(3) | 83(1) |
| C(8) | -1145(4) | -3845(2) | 5648(3) | 99(2) |
| C(9) | -137(3) | 669(2) | 7777(2) | 60(1) |
| C(10) | -1138(4) | 752(2) | 7651(3) | 76(1) |
| C(11) | -1535(4) | 1287(3) | 7089(3) | 95(2) |
| C(12) | -897(6) | 1741(3) | 6657(3) | 114(2) |
| C(13) | 89(6) | 1663(3) | 6770(4) | 112(2) |
| C(14) | 461(4) | 1137(2) | 7333(3) | 82(1) |
| C(15) | 1649(3) | -35(2) | 8357(2) | 63(1) |
| C(16) | 2110(4) | -435(3) | 7737(3) | 101(2) |
| C(17) | 3104(4) | -330(4) | 7615(4) | 132(2) |
| C(18) | 3634(4) | 148(4) | 8091(4) | 115(2) |
| C(19) | 3201(4) | 538(4) | 8732(4) | 120(2) |
| C(20) | 2204(4) | 433(3) | 8874(3) | 99(2) |
| C(21) | -3337(4) | -2043(2) | 5018(3) | 96(2) |
| C(22) | -3459(4) | -1926(3) | 4042(4) | 107(2) |
| C(23) | -2939(5) | -2540(3) | 3568(4) | 139(2) |
| C(24) | -2945(6) | -2444(4) | 2628(4) | 180(4) |

| | | | | |
|---|---|---|---|---|
| C(25) | -4957(3) | -1527(3) | 5452(3) | 90(1) |
| C(26) | -5422(5) | -2240(3) | 5656(4) | 140(3) |
| C(27) | -6522(7) | -2153(6) | 5586(8) | 262(8) |
| C(28) | -7081(7) | -2530(6) | 5216(5) | 204(5) |
| C(29) | -3506(4) | -1634(3) | 6535(3) | 101(2) |
| C(30) | -4002(5) | -1204(3) | 7232(3) | 117(2) |
| C(31) | -3373(7) | -1243(4) | 8097(4) | 173(3) |
| C(32) | -3655(10) | -915(5) | 8762(6) | 312(9) |
| C(33) | -3574(4) | -704(2) | 5330(3) | 84(1) |
| C(34) | -2499(4) | -539(3) | 5368(4) | 106(2) |
| C(35) | -2323(6) | 208(3) | 4980(4) | 137(3) |
| C(36) | -1275(7) | 388(4) | 4915(5) | 185(4) |

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

| | | | |
|---|---|---|---|
| Pd(1)-Cl(1) | 2.3001(12) | C(22)-C(23) | 1.522(7) |
| Pd(1)-Cl(1)#1 | 2.3001(12) | C(23)-C(24) | 1.435(8) |
| Pd(1)-P(1) | 2.3420(10) | C(25)-C(26) | 1.487(7) |
| Pd(1)-P(1)#1 | 2.3420(10) | C(26)-C(27) | 1.507(11) |
| P(1)-C(1) | 1.817(3) | C(27)-C(28) | 1.156(9) |
| P(1)-C(9) | 1.819(4) | C(29)-C(30) | 1.500(7) |
| P(1)-C(15) | 1.820(4) | C(30)-C(31) | 1.538(7) |
| O(1)-C(7) | 1.205(5) | C(31)-C(32) | 1.248(10) |
| N(1)-C(7) | 1.363(5) | C(33)-C(34) | 1.496(6) |
| N(1)-C(4) | 1.390(4) | C(34)-C(35) | 1.509(7) |
| N(2)-C(33) | 1.514(5) | C(35)-C(36) | 1.475(9) |
| N(2)-C(25) | 1.516(5) | | |
| N(2)-C(29) | 1.528(5) | Cl(1)-Pd(1)-Cl(1)#1 | 180.0 |
| N(2)-C(21) | 1.531(5) | Cl(1)-Pd(1)-P(1) | 87.25(4) |
| C(1)-C(6) | 1.380(5) | Cl(1)#1-Pd(1)-P(1) | 92.75(4) |
| C(1)-C(2) | 1.390(5) | Cl(1)-Pd(1)-P(1)#1 | 92.75(4) |
| C(2)-C(3) | 1.376(5) | Cl(1)#1-Pd(1)-P(1)#1 | 87.25(4) |
| C(3)-C(4) | 1.392(5) | P(1)-Pd(1)-P(1)#1 | 180.0 |
| C(4)-C(5) | 1.380(5) | C(1)-P(1)-C(9) | 102.49(17) |
| C(5)-C(6) | 1.376(5) | C(1)-P(1)-C(15) | 106.78(18) |
| C(7)-C(8) | 1.505(6) | C(9)-P(1)-C(15) | 103.63(18) |
| C(9)-C(14) | 1.378(5) | C(1)-P(1)-Pd(1) | 114.36(12) |
| C(9)-C(10) | 1.379(5) | C(9)-P(1)-Pd(1) | 118.25(13) |
| C(10)-C(11) | 1.391(6) | C(15)-P(1)-Pd(1) | 110.20(13) |
| C(11)-C(12) | 1.387(8) | C(7)-N(1)-C(4) | 128.2(4) |
| C(12)-C(13) | 1.356(8) | C(33)-N(2)-C(25) | 106.4(3) |
| C(13)-C(14) | 1.368(6) | C(33)-N(2)-C(29) | 110.1(3) |
| C(15)-C(16) | 1.365(6) | C(25)-N(2)-C(29) | 112.1(4) |
| C(15)-C(20) | 1.367(6) | C(33)-N(2)-C(21) | 111.4(4) |
| C(16)-C(17) | 1.389(7) | C(25)-N(2)-C(21) | 111.4(3) |
| C(17)-C(18) | 1.328(8) | C(29)-N(2)-C(21) | 105.7(4) |
| C(18)-C(19) | 1.359(7) | C(6)-C(1)-C(2) | 117.1(3) |
| C(19)-C(20) | 1.400(6) | C(6)-C(1)-P(1) | 121.3(3) |
| C(21)-C(22) | 1.497(7) | C(2)-C(1)-P(1) | 121.5(3) |

| | | | |
|---|---|---|---|
| C(3)-C(2)-C(1) | 121.0(3) | C(33)-C(34)-C(35) | 109.8(5) |
| C(2)-C(3)-C(4) | 121.2(3) | C(36)-C(35)-C(34) | 113.4(6) |
| C(5)-C(4)-N(1) | 124.5(3) | | |
| C(5)-C(4)-C(3) | 117.8(3) | | |
| N(1)-C(4)-C(3) | 117.6(3) | | |
| C(6)-C(5)-C(4) | 120.5(3) | | |
| C(5)-C(6)-C(1) | 122.2(3) | | |
| O(1)-C(7)-N(1) | 122.9(4) | | |
| O(1)-C(7)-C(8) | 122.9(4) | | |
| N(1)-C(7)-C(8) | 114.2(4) | | |
| C(14)-C(9)-C(10) | 117.9(4) | | |
| C(14)-C(9)-P(1) | 123.1(3) | | |
| C(10)-C(9)-P(1) | 119.0(3) | | |
| C(9)-C(10)-C(11) | 121.3(5) | | |
| C(12)-C(11)-C(10) | 118.3(5) | | |
| C(13)-C(12)-C(11) | 121.1(5) | | |
| C(12)-C(13)-C(14) | 119.5(5) | | |
| C(13)-C(14)-C(9) | 121.9(5) | | |
| C(16)-C(15)-C(20) | 118.0(4) | | |
| C(16)-C(15)-P(1) | 123.7(3) | | |
| C(20)-C(15)-P(1) | 118.2(3) | | |
| C(15)-C(16)-C(17) | 119.9(5) | | |
| C(18)-C(17)-C(16) | 122.0(5) | | |
| C(17)-C(18)-C(19) | 119.3(5) | | |
| C(18)-C(19)-C(20) | 119.5(5) | | |
| C(15)-C(20)-C(19) | 121.0(5) | | |
| C(22)-C(21)-N(2) | 114.9(4) | | |
| C(21)-C(22)-C(23) | 109.0(5) | | |
| C(24)-C(23)-C(22) | 113.3(6) | | |
| C(26)-C(25)-N(2) | 117.2(5) | | |
| C(25)-C(26)-C(27) | 108.9(7) | | |
| C(28)-C(27)-C(26) | 127.3(9) | | |
| C(30)-C(29)-N(2) | 115.9(4) | | |
| C(29)-C(30)-C(31) | 108.9(5) | | |
| C(32)-C(31)-C(30) | 119.2(8) | | |
| C(34)-C(33)-N(2) | 115.7(4) | | |

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Symmetry transformations used to generate equivalent atoms:

#1 -x,-y,-z+2

Table 4. Anisotropic displacement parameters ($Å^2$x $10^3$)for mar1109. The anisotropic displacement factor exponent takes the form: $-2\pi^2[ h^2a^{*2}U^{11} + ... + 2 h k a^* b^* U^{12} ]$

| | $U^{11}$ | $U^{22}$ | $U^{33}$ | $U^{23}$ | $U^{13}$ | $U^{12}$ |
|---|---|---|---|---|---|---|
| Pd(1) | 59(1) | 48(1) | 51(1) | -1(1) | 7(1) | 3(1) |
| Cl(1) | 95(1) | 71(1) | 64(1) | -1(1) | 5(1) | 32(1) |
| Cl(2) | 99(1) | 62(1) | 79(1) | 6(1) | 19(1) | -2(1) |
| P(1) | 60(1) | 51(1) | 50(1) | 0(1) | 8(1) | 0(1) |
| O(1) | 211(5) | 86(2) | 70(2) | -2(2) | -19(2) | -27(2) |
| N(1) | 94(3) | 55(2) | 64(2) | -1(2) | 0(2) | -6(2) |
| N(2) | 89(3) | 58(2) | 88(2) | -3(2) | 3(2) | 3(2) |
| C(1) | 62(3) | 49(2) | 55(2) | 1(2) | 8(2) | 0(2) |
| C(2) | 82(3) | 59(2) | 54(2) | 1(2) | 8(2) | 1(2) |
| C(3) | 85(3) | 53(2) | 62(2) | 7(2) | 8(2) | -4(2) |
| C(4) | 68(3) | 48(2) | 63(2) | -1(2) | 3(2) | -2(2) |
| C(5) | 96(3) | 61(2) | 51(2) | -5(2) | 4(2) | -10(2) |
| C(6) | 87(3) | 55(2) | 56(2) | 6(2) | 12(2) | -11(2) |
| C(7) | 97(4) | 70(3) | 81(3) | -6(2) | -14(3) | -8(2) |
| C(8) | 128(5) | 72(3) | 94(3) | -18(2) | -11(3) | -12(3) |
| C(9) | 71(3) | 54(2) | 54(2) | -1(2) | -1(2) | -2(2) |
| C(10) | 86(4) | 78(3) | 64(2) | -2(2) | 1(2) | 8(2) |
| C(11) | 99(4) | 100(4) | 84(3) | -14(3) | -24(3) | 37(3) |
| C(12) | 178(7) | 71(3) | 90(4) | 17(3) | -21(4) | 13(4) |
| C(13) | 142(6) | 81(4) | 112(4) | 36(3) | -6(4) | -14(4) |
| C(14) | 92(4) | 70(3) | 84(3) | 18(2) | -3(2) | -14(3) |
| C(15) | 58(2) | 71(2) | 59(2) | 3(2) | 5(2) | -3(2) |
| C(16) | 69(4) | 138(5) | 98(3) | -40(3) | 13(3) | 8(3) |
| C(17) | 68(4) | 208(7) | 119(5) | -52(5) | 20(3) | 8(4) |
| C(18) | 59(3) | 180(6) | 106(4) | -1(4) | 15(3) | -3(4) |
| C(19) | 72(4) | 163(6) | 125(5) | -17(4) | -6(3) | -43(4) |
| C(20) | 84(4) | 126(4) | 86(3) | -25(3) | 12(3) | -20(3) |
| C(21) | 99(4) | 66(3) | 124(4) | -10(3) | 22(3) | 0(3) |
| C(22) | 107(5) | 97(4) | 120(4) | -38(3) | 26(3) | -12(3) |
| C(23) | 169(6) | 96(4) | 157(5) | -27(4) | 87(5) | -28(4) |
| C(24) | 245(9) | 149(6) | 155(6) | -50(5) | 97(6) | -90(6) |

| | | | | | | |
|---|---|---|---|---|---|---|
| C(25) | 77(4) | 110(4) | 84(3) | -25(3) | 7(2) | 4(3) |
| C(26) | 138(6) | 124(5) | 161(6) | -63(4) | 55(5) | -59(4) |
| C(27) | 143(9) | 268(12) | 385(17) | -215(12) | 130(10) | -110(8) |
| C(28) | 164(9) | 280(12) | 164(7) | -88(7) | -55(6) | 89(8) |
| C(29) | 127(5) | 75(3) | 97(3) | 17(3) | -23(3) | 1(3) |
| C(30) | 186(6) | 85(3) | 77(3) | -3(3) | -16(3) | -4(4) |
| C(31) | 289(11) | 114(5) | 107(5) | 0(4) | -78(6) | 12(6) |
| C(32) | 540(20) | 200(10) | 179(9) | -89(7) | -188(12) | 177(12) |
| C(33) | 100(4) | 66(3) | 85(3) | 1(2) | -1(3) | 7(3) |
| C(34) | 115(5) | 81(3) | 123(4) | -7(3) | 13(3) | -15(3) |
| C(35) | 178(8) | 101(4) | 136(5) | 1(4) | 59(5) | -34(4) |
| C(36) | 212(9) | 180(7) | 171(7) | -38(6) | 99(6) | -76(7) |

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

| | x | y | z | U(eq) |
|---|---|---|---|---|
| H(2) | -425 | -1466 | 9024 | 78 |
| H(3) | -882 | -2527 | 8314 | 80 |
| H(5) | -412 | -1592 | 5987 | 83 |
| H(6) | -22 | -520 | 6699 | 79 |
| H(8A) | -1601 | -3896 | 5152 | 148 |
| H(8B) | -1415 | -4065 | 6159 | 148 |
| H(8C) | -540 | -4084 | 5521 | 148 |
| H(10) | -1556 | 445 | 7949 | 91 |
| H(11) | -2211 | 1338 | 7004 | 114 |
| H(12) | -1149 | 2105 | 6284 | 136 |
| H(13) | 509 | 1965 | 6468 | 134 |
| H(14) | 1138 | 1094 | 7418 | 99 |
| H(16) | 1760 | -777 | 7396 | 122 |
| H(17) | 3407 | -604 | 7186 | 158 |
| H(18) | 4295 | 215 | 7988 | 138 |
| H(19) | 3565 | 872 | 9073 | 144 |
| H(20) | 1914 | 685 | 9328 | 118 |
| H(21A) | -2642 | -2039 | 5181 | 115 |
| H(21B) | -3588 | -2525 | 5156 | 115 |
| H(22A) | -3180 | -1457 | 3885 | 129 |
| H(22B) | -4150 | -1923 | 3865 | 129 |
| H(23A) | -2265 | -2568 | 3796 | 166 |
| H(23B) | -3255 | -3001 | 3698 | 166 |
| H(24A) | -3493 | -2702 | 2359 | 270 |
| H(24B) | -2346 | -2634 | 2407 | 270 |
| H(24C) | -2999 | -1932 | 2490 | 270 |
| H(25A) | -5245 | -1154 | 5817 | 108 |
| H(25B) | -5129 | -1406 | 4842 | 108 |
| H(26A) | -5219 | -2395 | 6248 | 168 |
| H(26B) | -5218 | -2610 | 5243 | 168 |
| H(27A) | -6729 | -2133 | 6190 | 314 |

| | | | | |
|---|---|---|---|---|
| H(27B) | -6636 | -1668 | 5342 | 314 |
| H(28A) | -7077 | -2431 | 4594 | 306 |
| H(28B) | -7725 | -2440 | 5424 | 306 |
| H(28C) | -6906 | -3032 | 5323 | 306 |
| H(29A) | -3604 | -2151 | 6650 | 121 |
| H(29B) | -2807 | -1540 | 6593 | 121 |
| H(30A) | -4648 | -1404 | 7321 | 140 |
| H(30B) | -4077 | -698 | 7046 | 140 |
| H(31A) | -3298 | -1756 | 8252 | 207 |
| H(31B) | -2726 | -1059 | 7975 | 207 |
| H(32A) | -3486 | -406 | 8725 | 468 |
| H(32B) | -3344 | -1124 | 9283 | 468 |
| H(32C) | -4354 | -963 | 8791 | 468 |
| H(33A) | -3831 | -610 | 4735 | 101 |
| H(33B) | -3894 | -367 | 5720 | 101 |
| H(34A) | -2153 | -906 | 5039 | 128 |
| H(34B) | -2248 | -552 | 5976 | 128 |
| H(35A) | -2639 | 232 | 4396 | 164 |
| H(35B) | -2627 | 575 | 5344 | 164 |
| H(36A) | -989 | 475 | 5495 | 278 |
| H(36B) | -1209 | 818 | 4560 | 278 |
| H(36C) | -944 | -14 | 4648 | 278 |
| H(1) | -930(30) | -3200(20) | 7050(20) | 61(12) |