SUPPLEMENTARY INFORMATION

Synthesis, reactivity and catalytic activity in transfer hydrogenation of ketones of ruthenium(II) and ruthenium(IV) complexes containing the novel *N*-thiophosphorylated iminophosphorane-phosphine ligands $Ph_2PCH_2P\{=NP(=S)(OR)_2\}Ph_2$ (R = Et, Ph)

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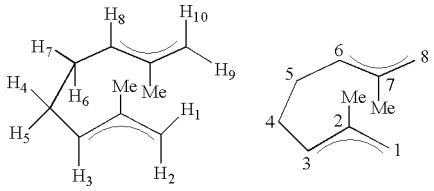
Analytical and Spectroscopic Data

General comments

Infrared spectra were recorded on a Perkin-Elmer 1720-XFT spectrometer. The conductivities were measured at room temperature, in *ca.* 10^{-3} mol dm^{-3} acetone solutions, with a Jenway PCM3 conductimeter. The C, H and N analyses were carried out with a Perkin-Elmer 2400 microanalyzer. Melting points were determined on a Büchi CH-9230 oil-based apparatus and are uncorrected. Mass spectra (MALDI-TOF) were recorded using a VOYAGER-DE STR spectrometer; α-cyano-4-hydroxycinnamic acid was used as the matrix. NMR spectra were recorded on a Bruker DPX-300 instrument operating at 300 MHz (^{1}H), 121.5 MHz (^{31}P) or 75.4 MHz (^{13}C) using $SiMe_4$ or 85% H_3PO_4 as standards. DEPT experiments have been carried out for all the compounds reported. The numbering for protons and carbons of the 2,7-dimethylocta-2,6-diene-1,8-diyl skeleton is as follows:



Compound 1a: Found: C, 63.28; H, 5.79; N, 2.62. $C_{29}H_{32}P_3O_2NS$ requires C, 63.15; H, 5.85; N, 2.54%; mp 118-120 °C; ν_{max}/cm^{-1} (KBr) 3055, 2980, 2888, 1484, 1435, 1389, 1233, 1116, 1037, 999, 957, 837, 793, 732, 693, 529, 494; δ_P ($CDCl_3$) -27.18 (d, ^{2}J(PP) = 62.7 Hz, Ph_2P), 15.66 (dd, ^{2}J(PP) = 62.7 and 32.1 Hz, Ph_2P=N), 60.63 (d, ^{2}J(PP) = 32.1 Hz, $(EtO)_2P$=S); δ_H ($CDCl_3$) 1.21 (t, 6H, ^{3}J(HH) = 7.1 Hz, OCH_2CH_3), 3.74 (d, 2H, ^{2}J(HP) = 13.9 Hz, PCH_2P), 4.01 (m, 4H, OCH_2), 7.17-7.47 (m, 16H, Ph), 7.68-7.75 (m, 4H, Ph); δ_C ($CDCl_3$) 16.06 (d, ^{3}J(CP) = 8.1 Hz, OCH_2CH_3), 27.99 (dd, ^{1}J(CP) = 64.1 and 34.4 Hz, PCH_2P), 61.85 (d, ^{2}J(CP) = 5.8 Hz, OCH_2), 128.17-132.91 (m, Ph), 137.49 (dd, ^{1}J(CP) = 14.6 Hz, ^{3}J(CP) = 7.6 Hz, C_{ipso} of Ph); MS (MALDI-TOF) *m/z*: 552 $[M + 1]^+$.

Compound 1b: Found: C, 68.55; H, 4.86; N, 2.24. $C_{37}H_{32}P_3O_2NS$ requires C, 68.62; H, 4.98; N, 2.16%; mp 120-122 °C; ν_{max}/cm^{-1} (KBr) 3066, 2972, 2885, 1485, 1435, 1270, 1178, 1164, 1115, 1024, 909, 883, 778, 734, 691, 531, 481; δ_P ($CDCl_3$) -27.58 (d, ^{2}J(PP) = 63.4 Hz, Ph_2P), 17.15 (dd, ^{2}J(PP) = 63.4 and 33.6 Hz, Ph_2P=N), 52.93 (d, ^{2}J(PP) = 33.6 Hz, $(PhO)_2P$=S); δ_H ($CDCl_3$) 3.60 (d, 2H, ^{2}J(HP) = 14.0 Hz, PCH_2P), 7.11-7.24 (m, 20H, Ph), 7.42-7.65 (m, 10H, Ph); δ_C ($CDCl_3$) 27.98 (dd, ^{1}J(CP) = 63.5 and 35.0 Hz, PCH_2P), 121.24-137.30 (m, Ph), 137.95 (dd, ^{1}J(CP) = 14.8 Hz, ^{3}J(CP) = 7.7 Hz, C_{ipso} of Ph), 152.06 (d, ^{2}J(CP) = 8.7 Hz, C_{ipso} of OPh); MS (MALDI-TOF) *m/z*: 648 $[M + 1]^+$.

Compound 2a: Found: C, 54.55; H, 5.37; N, 1.63. $RuC_{39}H_{46}P_3Cl_2O_2NS$ requires C, 54.61; H, 5.40; N, 1.63%; ν_{max}/cm^{-1} (KBr) 3042, 2969, 2901, 1589, 1483, 1437, 1385, 1253, 1167, 1035, 948, 799, 740, 690, 655, 504; δ_P (CD_2Cl_2) 11.81 (dd, ^2J(PP) = 38.7 and 25.3 Hz, Ph_2P=N), 22.75 (d, ^2J(PP) = 38.7 Hz, Ph_2P), 59.50 (d, ^2J(PP) = 25.3 Hz, $(EtO)_2P$=S); δ_H (CD_2Cl_2) 0.78 (d, 6H, ^3J(HH) = 6.6 Hz, CH(CH_3)$_2$), 1.03 (t, 6H, ^3J(HH) = 7.0 Hz, OCH_2CH_3), 1.74 (s, 3H, CH_3), 2.34 (sept, 1H, ^3J(HH) = 6.6 Hz, CH(CH_3)$_2$), 3.45 (m, 4H, OCH_2), 3.87 (dd, 2H, ^2J(HP) = 9.4 and 9.4 Hz, PCH_2P), 5.07 and 5.19 (d, 2H each, ^3J(HH) = 5.6 Hz, CH of *p*-cymene), 7.23-8.02 (m, 20H, Ph); δ_C (CD_2Cl_2) 16.27 (d, ^3J(CP) = 6.4 Hz, OCH_2CH_3), 17.47 (s, CH_3), 21.45 (s, CH(*C*H$_3$)$_2$), 21.75 (ddd, ^1J(CP) = 75.5 and 18.6 Hz, ^3J(CP) = 6.4 Hz, PCH_2P), 30.41 (s, *C*H(CH$_3$)$_2$), 61.58 (d, ^2J(CP) = 5.8 Hz, OCH_2), 86.10 (d, ^2J(CP) = 5.8 Hz, CH of *p*-cymene), 90.67 (d, ^2J(CP) = 4.1 Hz, CH of *p*-cymene), 94.63 and 108.23 (s, C of *p*-cymene), 128.23-134.51 (m, Ph).

Compound 2b: Found: C, 58.90; H, 4.57; N, 1.45. $RuC_{47}H_{46}P_3Cl_2O_2NS$ requires C, 59.18; H, 4.86; N, 1.47%; ν_{max}/cm^{-1} (KBr) 3038, 2963, 2899, 1488, 1438, 1429, 1303, 1198, 1107, 1026, 909, 823, 767, 692, 616, 546, 492; δ_P (CD_2Cl_2) 13.53 (dd, ^2J(PP) = 39.3 and 23.4 Hz, Ph_2P=N), 23.94 (d, ^2J(PP) = 39.3 Hz, Ph_2P), 51.69 (d, ^2J(PP) = 23.4 Hz, $(PhO)_2P$=S); δ_H (CD_2Cl_2) 0.77 (d, 6H, ^3J(HH) = 6.8 Hz, CH(CH_3)$_2$), 1.78 (s, 3H, CH_3), 2.38 (sept, 1H, ^3J(HH) = 6.8 Hz, CH(CH_3)$_2$), 4.02 (dd, 2H, ^2J(HP) = 9.8 and 9.8 Hz, PCH_2P), 5.06 and 5.21 (d, 2H each, ^3J(HH) = 5.1 Hz, CH of *p*-cymene), 7.22-8.05 (m, 30H, Ph); δ_C (CD_2Cl_2) 17.51 (s, CH_3), 20.30 (ddd, ^1J(CP) = 75.4 and 18.9 Hz, ^3J(CP) = 6.2 Hz, PCH_2P), 21.38 (s, CH(*C*H$_3$)$_2$), 30.43 (s, *C*H(CH$_3$)$_2$), 86.11 (d, ^2J(CP) = 5.8 Hz, CH of *p*-cymene), 90.69 (d, ^2J(CP) = 4.6 Hz, CH of *p*-cymene), 94.57 and 108.27 (s, C of *p*-cymene), 121.64-134.52 (m, Ph), 152.54 (d, ^2J(CP) = 8.7 Hz, C_{ipso} of OPh).

Compound 3a: Found: C, 43.54; H, 4.37; N, 1.31. $RuC_{39}H_{46}F_6P_3O_2ClNSSb\cdot 1/4CH_2Cl_2$ requires C, 43.68; H, 4.34; N, 1.30%; conductivity (acetone, 20°C) 129 Ω^{-1} cm^2 mol^{-1}; ν_{max}/cm^{-1} (KBr) 3053, 2972, 1437, 1260, 1118, 1061, 1036, 849, 776, 738, 695, 624, 534; δ_P (CD_2Cl_2) 14.48 (dd, ^2J(PP) = 26.4 and 3.8 Hz, Ph_2P=N), 25.91 (dd, ^3J(PP) = 10.7 Hz, ^2J(PP) = 3.8 Hz, Ph_2P), 54.92 (dd, ^2J(PP) = 26.4 Hz, ^3J(PP) = 10.7 Hz, $(EtO)_2P$=S); δ_H (CD_2Cl_2) 0.83 (d, 3H, ^3J(HH) = 6.5 Hz, CH(CH_3)$_2$), 0.98 (d, 3H, ^3J(HH) = 6.1 Hz, CH(CH_3)$_2$), 1.08 (t, 3H, ^3J(HH) = 6.4 Hz, OCH_2CH_3), 1.46 (t, 3H, ^3J(HH) = 6.6 Hz, OCH_2CH_3), 2.04 (s, 3H, CH_3), 2.44 (m, 1H, CH(CH_3)$_2$), 3.15 and 5.63 (m, 1H each, PCH_2P), 4.13 and 4.99 (m, 2H each, OCH_2), 4.95 and 5.30 (s, 1H each, CH of *p*-cymene), 5.55 and 5.71 (d, 1H each, ^3J(HH) = 4.8 Hz, CH of *p*-cymene), 7.09-7.58 (m, 20H, Ph); δ_C (CD_2Cl_2) 15.78 and 16.37 (d, ^3J(CP) = 8.4 Hz, OCH_2CH_3), 18.52 (s, CH_3), 21.76 and 21.98 (s, CH(*C*H$_3$)$_2$), 26.84 (dd, ^1J(CP) = 59.5 and 16.9 Hz, PCH_2P), 30.92 (s, *C*H(CH$_3$)$_2$), 64.47 and 64.86 (d, ^2J(CP) = 8.4 Hz, OCH_2), 87.96 and 88.09 (s, CH of *p*-cymene), 90.32 (d, ^2J(CP) = 9.9 Hz, CH of *p*-cymene), 95.00 (d, ^2J(CP) = 9.0 Hz, CH of *p*-cymene), 102.00 and 113.12 (s, C of *p*-cymene), 126.95-138.97 (m, Ph).

Compound 3b: Found: C, 49.18; H, 4.10; N, 1.25. $RuC_{47}H_{46}F_6P_3O_2ClNSSb$ requires C, 48.91; H, 4.02; N, 1.21%; conductivity (acetone, 20°C) 118 Ω^{-1} cm^2 mol^{-1}; ν_{max}/cm^{-1} (KBr) 3060, 2965, 1486, 1437, 1363, 1187, 1157, 1057, 942, 903, 830, 769, 740, 692, 533, 503; δ_P (CD_2Cl_2) 13.12 (dd, ^2J(PP) = 28.3 and 3.8 Hz, Ph_2P=N), 26.36 (dd, ^3J(PP) = 4.9 Hz, ^2J(PP) = 3.8 Hz, Ph_2P), 46.61 (dd, ^2J(PP) = 28.3 Hz, ^3J(PP) = 4.9 Hz, $(PhO)_2P$=S); δ_H (CD_2Cl_2) 0.95 and 1.02 (d, 3H each, ^3J(HH) = 6.8 Hz, CH(CH_3)$_2$), 1.95 (s, 3H, CH_3), 2.52 (m, 1H, CH(CH$_3$)$_2$), 3.17 and 5.26 (m, 1H each, PCH_2P), 4.76 and 5.09 (d, 1H each, ^3J(HH) = 5.7 Hz, CH of *p*-cymene), 5.27 and 5.56 (d, 1H each, ^3J(HH) = 6.3 Hz, CH of *p*-cymene), 6.81-7.62 (m, 30H, Ph); δ_C (CD_2Cl_2) 18.30 (s, CH_3), 21.84 and 22.04 (s, CH(*C*H$_3$)$_2$), 26.75 (dd, ^1J(CP) = 64.0 and 16.3 Hz, PCH_2P), 30.98 (s, *C*H(CH$_3$)$_2$), 88.72 (d, ^2J(CP) = 1.8 Hz, CH of *p*-cymene), 89.77 (d, ^2J(CP) = 3.0 Hz, CH of *p*-cymene), 94.49 and 94.55 (s, CH of *p*-cymene), 100.80 and 114.44 (s, C of *p*-cymene), 121.12-139.00 (m, Ph), 151.18 (d, ^2J(CP) = 9.9 Hz, C_{ipso} of OPh), 151.54 (d, ^2J(CP) = 11.1 Hz, C_{ipso} of OPh).

Compound 4a: Found: C, 37.56; H, 3.54; N, 1.30. $RuC_{39}H_{46}F_{12}P_3O_2Sb_2NS$ requires C, 37.23; H, 3.68; N, 1.11%; conductivity (acetone, 20°C) 190 Ω^{-1} cm^2 mol^{-1}; ν_{max}/cm^{-1} (KBr) 3059, 2970, 1437, 1391, 1284, 1165, 1149, 1060, 997, 776, 738, 695, 622, 510, 487; δ_P (CD_2Cl_2) 43.38 (dd, ^2J(PP) = 12.3 Hz, ^3J(PP) = 5.7 Hz, Ph_2P), 46.00 (dd, ^2J(PP) = 32.5 and 12.3 Hz, Ph_2P=N), 54.67 (dd, ^2J(PP) = 32.5 Hz, ^3J(PP) = 5.7 Hz, $(EtO)_2P$=S); δ_H (CD_2Cl_2) 0.55 and 1.55 (t, 3H each, ^3J(HH) = 6.8 Hz, OCH$_2$CH_3), 0.88 and 1.13 (d, 3H each, ^3J(HH) = 6.8 Hz, CH(CH_3)$_2$), 1.18 (s, 3H, CH_3), 2.12 (m, 1H, CH(CH$_3$)$_2$), 3.44 and 3.90 (m, 2H each, OCH_2), 4.72 and 4.94 (m, 1H each, PCH_2P), 5.73 and 6.20 (d, 1H each, ^3J(HH) = 5.3 Hz, CH of *p*-cymene), 5.88 and 6.27 (d, 1H each, ^3J(HH) = 5.7 Hz, CH of *p*-cymene), 7.14-8.30 (m, 20H, Ph); δ_C (CD_2Cl_2) 14.92 (d, ^3J(CP) = 8.2 Hz, OCH$_2$*C*H$_3$), 16.10 (d, ^3J(CP) = 9.3 Hz, OCH$_2$*C*H$_3$), 16.83 (s, CH_3), 21.35 and 22.28 (s, CH(*C*H$_3$)$_2$), 25.58 (dd, ^1J(CP) = 68.1 and 19.3 Hz, PCH_2P), 30.92 (s, *C*H(CH$_3$)$_2$), 65.62 (d, ^2J(CP) = 7.6 Hz, OCH_2), 67.79 (d, ^2J(CP) = 9.9 Hz, OCH_2), 79.51, 91.90 and 94.61 (s, CH of *p*-cymene), 89.50 (d, ^2J(CP) = 7.6 Hz, CH of *p*-cymene), 106.08 (s, C of *p*-cymene), 121.93-135.90 (m, Ph and C of *p*-cymene).

Compound 4b: Found: C, 41.36; H, 3.61; N, 1.19. $RuC_{47}H_{46}F_{12}P_3O_2Sb_2NS$ requires C, 41.68; H, 3.42; N, 1.03%; conductivity (acetone, 20°C) 197 Ω^{-1} cm^2 mol^{-1}; ν_{max}/cm^{-1} (KBr) 3063, 2969, 1586, 1485, 1438, 1378, 1191, 1152, 1063, 944, 772, 743, 691, 631, 509, 485; δ_P (CD_2Cl_2) 39.85 (dd, ^2J(PP) = 9.8 Hz, ^3J(PP) = 9.8 Hz, Ph_2P), 44.47 (dd, ^2J(PP) = 32.6 and 9.8 Hz, Ph_2P=N), 56.95 (dd, ^2J(PP) = 32.6 Hz, ^3J(PP) = 9.8 Hz, $(PhO)_2P$=S); δ_H (CD_2Cl_2) 0.91 (s, 3H, CH_3), 0.93 and 1.02 (d, 3H each, ^3J(HH) = 6.8 Hz, CH(CH_3)$_2$), 2.05 (m, 1H, CH(CH$_3$)$_2$), 3.98 and 5.17 (m, 1H each, PCH_2P), 5.57 and 5.87 (d, 1H each, ^3J(HH) = 4.7 Hz, CH of *p*-cymene), 6.18 and 6.35 (d, 1H each, ^3J(HH) = 6.3 Hz, CH of *p*-cymene), 6.95-8.37 (m, 30H, Ph); δ_C (CD_2Cl_2) 16.44 (s, CH_3), 21.19 and 22.10 (s, CH(*C*H$_3$)$_2$), 25.10 (dd, ^1J(CP) = 67.3 and 19.0 Hz, PCH_2P), 31.21 (s, *C*H(CH$_3$)$_2$), 77.45, 92.69 and 94.99 (s, CH of *p*-cymene), 89.56 (d,

^2J(CP) = 8.2 Hz, CH of *p*-cymene), 104.87 (s, C of *p*-cymene), 119.23-135.09 (m, Ph and C of *p*-cymene), 148.37 (d, ^2J(CP) = 10.5 Hz, C_{ipso} of OPh), 149.50 (d, ^2J(CP) = 12.3 Hz, C_{ipso} of OPh).

Compound 5a: Found: C, 54.12; H, 5.42; N, 1.61. $RuC_{39}H_{48}P_3Cl_2O_2NS$ requires C, 54.48; H, 5.63; N, 1.63%; ν_{max}/cm^{-1} (KBr) 3051, 2974, 2898, 1435, 1385, 1277, 1247, 1167, 1106, 1029, 947, 795, 761, 743, 688, 655, 542, 506, 476; δ_P (CD_2Cl_2) 11.58 (dd, ^2J(PP) = 37.4 and 27.9 Hz, Ph_2P=N), 20.30 (d, ^2J(PP) = 37.4 Hz, Ph_2P), 59.68 (d, ^2J(PP) = 27.9 Hz, $(EtO)_2P$=S); δ_H (CD_2Cl_2) 1.10 (t, 6H, ^3J(HH) = 6.9 Hz, OCH_2CH_3), 2.10 (s, 6H, CH_3), 2.61 (m, 2H, H_4 and H_6), 3.17 (d, 2H, ^3J(HP) = 3.1 Hz, H_2 and H_{10}), 3.39 (m, 2H, H_5 and H_7), 3.64 (m, 4H, OCH_2), 4.08 and 4.35 (m, 1H each, PCH_2P), 4.17 (d, 2H, ^3J(HP) = 9.7 Hz, H_1 and H_9), 5.13 (m, 2H, H_3 and H_8), 7.00-7.90 (m, 20H, Ph); δ_C (CD_2Cl_2) 16.28 (d, ^3J(CP) = 9.3 Hz, OCH_2CH_3), 20.90 (s, CH_3), 25.02 (ddd, ^1J(CP) = 71.9 and 16.0 Hz, ^3J(CP) = 4.9 Hz, PCH_2P), 36.88 (s, C_4 and C_5), 61.90 (d, ^2J(CP) = 5.8 Hz, OCH_2), 68.68 (d, ^2J(CP) = 5.2 Hz, C_1 and C_8), 107.80 (d, ^2J(CP) = 10.5 Hz, C_3 and C_6), 126.04 (s, C_2 and C_7), 127.20-134.60 (m, Ph).

Compound 5b: Found: C, 59.05; H, 4.90; N, 1.33. $RuC_{47}H_{48}P_3Cl_2O_2NS$ requires C, 59.06; H, 5.06; N, 1.46%; ν_{max}/cm^{-1} (KBr) 3052, 2911, 2871, 1486, 1433, 1384, 1263, 1189, 1106, 1071, 1025, 899, 856, 802, 732, 688, 655, 621, 601, 539, 501, 464; δ_P (CD_2Cl_2) 13.49 (dd, ^2J(PP) = 38.1 and 25.5 Hz, Ph_2P=N), 20.74 (d, ^2J(PP) = 38.1 Hz, Ph_2P), 51.84 (d, ^2J(PP) = 25.5 Hz, $(PhO)_2P$=S); δ_H (CD_2Cl_2) 2.13 (s, 6H, CH_3), 2.63 (m, 2H, H_4 and H_6), 3.21 (br, 2H, H_2 and H_{10}), 3.42 (m, 2H, H_5 and H_7), 4.14 and 4.43 (m, 1H each, PCH_2P), 4.22 (d, 2H, ^3J(HP) = 9.7 Hz, H_1 and H_9), 5.18 (m, 2H, H_3 and H_8), 6.90-7.75 (m, 30H, Ph); δ_C (CD_2Cl_2) 20.93 (s, CH_3), 24.71 (ddd, ^1J(CP) = 71.6 and 15.1 Hz, ^3J(CP) = 4.7 Hz, PCH_2P), 36.94 (s, C_4 and C_5), 68.59 (d, ^2J(CP) = 5.2 Hz, C_1 and C_8), 108.02 (d, ^2J(CP) = 10.5 Hz, C_3 and C_6), 126.02 (s, C_2 and C_7), 121.50-134.89 (m, Ph), 152.60 (d, ^2J(CP) = 8.7 Hz, C_{ipso} of OPh).

Compound 6a: Found: C, 43.98; H, 4.54; N, 1.31. $RuC_{39}H_{48}F_6P_3O_2ClNSSb$ requires C, 44.19; H, 4.56; N, 1.32%; conductivity (acetone, 20°C) 119 Ω^{-1} cm^2 mol^{-1}; ν_{max}/cm^{-1} (KBr) 3059, 2982, 2905, 1437, 1386, 1249, 1160, 1114, 1024, 968, 844, 790, 744, 718, 692, 658, 589, 535, 506, 486; δ_P (CD_2Cl_2) 8.33 (s, Ph_2P), 15.36 (d, ^2J(PP) = 24.9 Hz, Ph_2P=N), 54.30 (d, ^2J(PP) = 24.9 Hz, $(EtO)_2P$=S); δ_H (CD_2Cl_2) 1.08 and 1.26 (t, 3H each, ^3J(HH) = 6.8 Hz, OCH_2CH_3), 2.11 and 2.42 (s, 3H each, CH_3), 2.47 and 3.77 (d, 1H each, ^3J(HP) = 6.4 Hz, H_2 and H_{10}), 2.78 (m, 2H, H_4 and H_6), 3.10 and 3.28 (m, 1H each, H_5 and H_7), 3.94 (m, 4H, OCH_2), 4.02 and 4.75 (m, 1H each, PCH_2P), 4.09 and 4.87 (d, 1H each, ^3J(HP) = 9.4 Hz, H_1 and H_9), 4.95 and 5.39 (m, 1H each, H_3 and H_8), 7.00-7.70 (m, 20H, Ph); δ_C (CD_2Cl_2) 15.86 (d, ^3J(CP) = 8.2 Hz, OCH_2CH_3), 16.28 (d, ^3J(CP) = 7.0 Hz, OCH_2CH_3), 19.66 (d, ^3J(CP) = 5.2 Hz, CH_3), 20.83 (s, CH_3), 27.49 (dd, ^1J(CP) = 56.2 and 8.7 Hz, PCH_2P), 35.95 and 36.11 (s, C_4 and C_5), 56.88 (d, ^2J(CP) = 5.2 Hz, C_1 or C_8), 64.96 (d, ^2J(CP) = 9.9 Hz, OCH_2), 65.14 (d, ^2J(CP) = 8.2 Hz, OCH_2), 72.62 (s, C_1 or C_8), 106.28 and 110.70 (d, ^2J(CP) = 10.5 Hz, C_3 and C_6), 121.57 and 124.90 (s, C_2 and C_7), 128.00-139.50 (m, Ph).

Compound 6b: Found: C, 47.50; H, 3.95; N, 1.22. $RuC_{47}H_{48}F_6P_3O_2ClNSSb{\cdot}1/2CH_2Cl_2$ requires C, 47.60; H, 4.12; N, 1.17%; conductivity (acetone, 20°C) 135 Ω^{-1} cm^2 mol^{-1}; ν_{max}/cm^{-1} (KBr) 3058, 2969, 2916, 2857, 1486, 1436, 1382, 1356, 1282, 1185, 1161, 1110, 1023, 998, 931, 835, 770, 743, 690, 534, 503, 487; δ_P (CD_2Cl_2) 14.42 (s, Ph_2P), 15.52 (d, ^2J(PP) = 27.9 Hz, Ph_2P=N), 46.38 (d, ^2J(PP) = 27.9 Hz, $(PhO)_2P$=S); δ_H (CD_2Cl_2) 2.14 and 2.34 (s, 3H each, CH_3), 2.60 (m, 2H, H_4 and H_6), 2.72 (d, 1H, ^3J(HP) = 5.4 Hz, H_2 or H_{10}), 3.27 (m, 2H, H_5 and H_7), 4.05 (d, 1H, ^3J(HP) = 4.8 Hz, H_2 or H_{10}), 4.11 (d, 1H, ^3J(HP) = 8.3 Hz, H_1 or H_9), 4.23 and 4.53 (m, 1H each, PCH_2P), 4.70 (d, 1H, ^3J(HP) = 8.0 Hz, H_1 or H_9), 5.12 and 5.50 (m, 1H each, H_3 and H_8), 7.00-7.60 (m, 30H, Ph); δ_C (CD_2Cl_2) 19.74 (d, ^3J(CP) = 5.8 Hz, CH_3), 21.40 (s, CH_3), 29.31 (dd, ^1J(CP) = 57.1 and 7.6 Hz, PCH_2P), 36.24 and 37.25 (s, C_4 and C_5), 55.66 (d, ^2J(CP) = 4.1 Hz, C_1 or C_8), 71.62 (s, C_1 or C_8), 108.32 and 110.92 (d, ^2J(CP) = 9.9 Hz, C_3 and C_6), 124.71 and 126.40 (s, C_2 and C_7), 120.50-134.89 (m, Ph), 150.67 (d, ^2J(CP) = 10.5 Hz, C_{ipso} of OPh), 150.99 (d, ^2J(CP) = 12.8 Hz, C_{ipso} of OPh).

Compound 7a: Found: C, 36.89; H, 3.93; N, 1.30. $RuC_{39}H_{48}F_{12}P_3O_2Sb_2NS$ requires C, 37.17; H, 3.84; N, 1.11%; conductivity (acetone, 20°C) 195 Ω^{-1} cm^2 mol^{-1}; ν_{max}/cm^{-1} (KBr) 3066, 2999, 2938, 1588, 1486, 1475, 1456, 1388, 1339, 1317, 1291, 1159, 1139, 1117, 1040, 1012, 975, 817, 800, 749, 695, 657, 623, 565, 524, 504, 481; δ_P (CD_2Cl_2) 33.28 (dd, ^2J(PP) = 28.3 Hz, ^3J(PP) = 4.9 Hz, Ph_2P), 53.55 (dd, ^2J(PP) = 21.9 Hz, ^3J(PP) = 4.9 Hz, $(EtO)_2P$=S), 55.31 (dd, ^2J(PP) = 28.3 and 21.9 Hz, Ph_2P=N); δ_H (CD_2Cl_2) 1.04 and 1.25 (t, 3H each, ^3J(HH) = 6.9 Hz, OCH_2CH_3), 1.88 (d, 3H, ^4J(HP) = 2.0 Hz, CH_3), 2.43 (m, 1H, H_4 or H_6), 2.59 (s, 3H, CH_3), 2.74 (m, 2H, H_4 or H_6 and H_5 or H_7), 3.65 (m, 1H, H_5 or H_7), 3.76 (d, 1H, ^3J(HP) = 3.1 Hz, H_2 or H_{10}), 3.79 (br, 1H, H_1 or H_9), 4.02 (m, 7H, OCH_2, PCH_2P and H_1 or H_9), 4.27 and 5.09 (m, 1H each, H_3 and H_8), 5.13 (d, 1H, ^3J(HP) = 3.1 Hz, H_2 or H_{10}), 7.20-8.15 (m, 20H, Ph); δ_C (CD_2Cl_2) 15.72 and 15.89 (d, ^3J(CP) = 5.7 Hz, OCH_2CH_3), 18.69 (d, ^3J(CP) = 2.5 Hz, CH_3), 21.39 (s, CH_3), 32.12 and 35.48 (s, C_4 and C_5), 34.26 (ddd, ^1J(CP) = 78.7 and 17.8 Hz, ^3J(CP) = 8.3 Hz, PCH_2P), 67.59 and 67.78 (d, ^2J(CP) = 7.6 Hz, OCH_2), 73.75 and 75.42 (s, C_1 and C_8), 92.26 (s, C_3 or C_6), 97.65 (d, ^2J(CP) = 6.3 Hz, C_3 or C_6), 122.19 and 128.27 (s, C_2 and C_7), 121.10-136.65 (m, Ph).

Compound 7b: Found: C, 41.33; H, 3.68; N, 1.14. $RuC_{47}H_{48}F_{12}P_3O_2Sb_2NS$ requires C, 41.62; H, 3.57; N, 1.03%; conductivity (acetone, 20°C) 184 Ω^{-1} cm^2 mol^{-1}; ν_{max}/cm^{-1} (KBr) 3065, 2976, 2924, 1587, 1486, 1456, 1438, 1385, 1338, 1316, 1197, 1156, 1142, 1118, 1073, 1023, 999, 947, 793, 774, 746, 690, 659, 642, 578, 519, 502, 483; δ_P (CD_2Cl_2) 30.90 (dd, ^2J(PP) = 27.1 Hz, ^3J(PP) = 4.5 Hz, Ph_2P), 46.46 (dd, ^2J(PP) = 24.8 Hz, ^3J(PP) = 4.5 Hz, $(PhO)_2P$=S), 55.69 (dd, ^2J(PP) = 27.1 and 24.8 Hz, Ph_2P=N); δ_H (CD_2Cl_2) 1.91 (d, 3H, ^4J(HP) = 1.8 Hz, CH_3), 2.42 (s, 3H, CH_3), 2.71 (m, 4H, H_4, H_5, H_6 and H_7), 3.83 (d, 1H, ^3J(HP) = 2.3 Hz, H_2 or H_{10}), 4.03 (d, 1H, ^3J(HP) = 4.7 Hz, H_1 or H_9), 4.11 and 4.53 (m, 1H each, PCH_2P), 4.18 (m, 1H, H_1 or H_9), 4.53 and 5.12 (m, 1H each, H_3 and H_8), 5.28

(d, 1H, ^{3}J(HP) = 2.8 Hz, H_2 or H_{10}), 6.60-8.15 (m, 30H, Ph); δ_C (CD_2Cl_2) 17.86 (d, ^{3}J(CP) = 2.1 Hz, CH_3), 20.31 (s, CH_3), 31.48 (ddd, ^{1}J(CP) = 93.7 and 18.3 Hz, ^{3}J(CP) = 7.4 Hz, PCH_2P), 31.64 and 34.78 (s, C_4 and C_5), 73.02 and 75.16 (s, C_1 and C_8), 92.28 (s, C_3 or C_6), 97.52 (d, ^{2}J(CP) = 6.9 Hz, C_3 or C_6), 122.40 and 127.14 (s, C_2 and C_7), 120.20-136.20 (m, Ph), 147.81 (d, ^{2}J(CP) = 9.5 Hz, C_{ipso} of OPh), 148.28 (d, ^{2}J(CP) = 10.1 Hz, C_{ipso} of OPh).

Compound 8: Found: C, 37.12; H, 3.63; N, 1.99. $RuC_{41}H_{49}F_{12}P_3N_2O_2Sb_2S\cdot 1/2CH_2Cl_2$ requires C, 37.14; H, 3.75; N, 2.08%; conductivity (acetone, 20°C) 191 Ω^{-1} cm^2 mol^{-1}; ν_{max}/cm^{-1} (KBr) 3076, 2980, 2291, 1482, 1439, 1392, 1262, 1162, 1113, 1036, 1025, 970, 845, 789, 742, 694, 658, 589, 537, 502, 488; δ_P (CD_2Cl_2) 13.48 (dd, ^{2}J(PP) = 30.1 and 5.0 Hz, Ph_2P=N), 27.79 (d, ^{2}J(PP) = 5.0 Hz, Ph_2P), 50.58 (d, ^{2}J(PP) = 30.1 Hz, $(EtO)_2P$=S); δ_H (CD_2Cl_2) 0.98 and 1.10 (d, 3H each, ^{3}J(HH) = 5.4 Hz, $CH(CH_3)_2$), 1.34 (t, 6H, ^{3}J(HH) = 8.1 Hz, OCH_2CH_3), 2.10 (s, 3H, CH_3), 2.38 (s, 3H, $CH_3C{\equiv}N$), 2.52 (m, 1H, $CH(CH_3)_2$), 3.95 (m, 2H, PCH_2P), 4.13 (m, 4H, OCH_2), 5.51 (br, 2H, CH of *p*-cymene), 5.58 and 5.65 (br, 1H each, CH of *p*-cymene), 7.29-7.55 (m, 20H, Ph); δ_C (CD_2Cl_2) 4.13 (s, $CH_3C{\equiv}N$), 15.27 (d, ^{3}J(CP) = 8.5 Hz, OCH_2CH_3), 15.87 (d, ^{3}J(CP) = 8.0 Hz, OCH_2CH_3), 17.98 (s, CH_3), 20.71 and 21.84 (s, $CH(CH_3)_2$), 26.48 (dd, ^{1}J(CP) = 58.3 and 16.5 Hz, PCH_2P), 30.46 (s, $CH(CH_3)_2$), 64.84 (d, ^{2}J(CP) = 3.2 Hz, OCH_2), 64.90 (d, ^{2}J(CP) = 5.3 Hz, OCH_2), 89.67 and 90.50 (s, CH of *p*-cymene), 93.01 (d, ^{2}J(CP) = 3.2 Hz, CH of *p*-cymene), 95.29 (d, ^{2}J(CP) = 4.8 Hz, CH of *p*-cymene), 108.07 and 116.05 (s, C of *p*-cymene), 120.86-136.28 (m, Ph and C≡N).

Compound 9: Found: C, 35.87; H, 4.14; N, 1.01. $RuC_{42}H_{55}F_{12}P_4O_2Sb_2NS\cdot 3/2CH_2Cl_2$ requires C, 35.74; H, 4.00; N, 0.96%; conductivity (acetone, 20°C) 191 Ω^{-1} cm^2 mol^{-1}; ν_{max}/cm^{-1} (KBr) 3062, 2982, 2930, 1484, 1436, 1392, 1288, 1262, 1162, 1109, 1090, 1026, 953, 851, 739, 695, 658, 585, 535, 490; δ_P (CD_2Cl_2) 1.30 (dd, ^{2}J(PP) = 49.5 Hz, ^{3}J(PP) = 37.1 Hz, PMe_3), 20.64 (dd, ^{2}J(PP) = 27.6 and 9.6 Hz, Ph_2P=N), 33.63 (ddd, ^{2}J(PP) = 49.5 and 9.6 Hz, ^{3}J(PP) = 8.6 Hz, Ph_2P), 51.11 (ddd, ^{3}J(PP) = 37.1 and 8.6 Hz, ^{2}J(PP) = 27.6 Hz, $(EtO)_2P$=S); δ_H (CD_2Cl_2) 1.31 (br, 6H, $CH(CH_3)_2$), 1.45 (d, 9H, ^{2}J(HP) = 10.0 Hz, PCH_3), 1.70 (s, 3H, CH_3), 1.80 (t, 6H, ^{3}J(HH) = 6.7 Hz, OCH_2CH_3), 3.00 (m, 1H, $CH(CH_3)_2$), 3.96 (m, 2H, PCH_2P), 4.20 and 4.69 (m, 2H each, OCH_2), 5.99 and 6.79 (d, 1H each, ^{3}J(HH) = 5.2 Hz, CH of *p*-cymene), 6.28 and 6.32 (br, 1H each, CH of *p*-cymene), 7.26-7.76 (m, 20H, Ph); δ_C (CD_2Cl_2) 13.74 (d, ^{3}J(CP) = 7.0 Hz, OCH_2CH_3), 16.00 (d, ^{3}J(CP) = 8.2 Hz, OCH_2CH_3), 18.24 (d, ^{1}J(CP) = 34.9 Hz, PCH_3), 18.63 (s, CH_3), 22.16 and 22.67 (s, $CH(CH_3)_2$), 25.27 (dd, ^{1}J(CP) = 57.7 and 15.1 Hz, PCH_2P), 31.31 (s, $CH(CH_3)_2$), 66.05 (d, ^{2}J(CP) = 7.0 Hz, OCH_2), 66.52 (d, ^{2}J(CP) = 10.1 Hz, OCH_2), 93.67 (s, CH of *p*-cymene), 95.75 and 100.69 (d, ^{2}J(CP) = 4.7 Hz, CH of *p*-cymene), 96.20 (d, ^{2}J(CP) = 5.2 Hz, CH of *p*-cymene), 111.92 (s, C of *p*-cymene), 123.58-133.83 (m, Ph and C of *p*-cymene).

Compound 10: Found: C, 39.71; H, 4.17; N, 0.97. $RuC_{47}H_{57}F_{12}P_4O_2Sb_2NS\cdot 1/2CH_2Cl_2$ requires C, 39.65; H, 4.06; N, 0.97%; conductivity (acetone, 20°C) 208 Ω^{-1} cm^2 mol^{-1}; ν_{max}/cm^{-1} (KBr) 3062, 2981, 2914, 1483, 1437, 1392, 1265,

1263, 1110, 1090, 1025, 967, 945, 909, 845, 738, 696, 657, 585, 535, 491, 451; δ_P (CD_2Cl_2) 0.78 (dd, ^2J(PP) = 49.7 Hz, ^3J(PP) = 33.4 Hz, PMe_2Ph), 20.48 (dd, ^2J(PP) = 30.7 and 12.7 Hz, $Ph_2P{=}N$), 34.80 (ddd, ^2J(PP) = 49.7 and 12.7 Hz, ^3J(PP) = 9.0 Hz, Ph_2P), 49.66 (ddd, ^3J(PP) = 33.4 and 9.0 Hz, ^2J(PP) = 30.7 Hz, $(EtO)_2P{=}S$); δ_H (CD_2Cl_2) 1.09, 1.31, 1.79 and 1.97 (br, 3H each, $CH(CH_3)_2$ and OCH_2CH_3), 1.41 (d, 6H, ^2J(HP) = 17.9 Hz, PCH_3), 1.99 (s, 3H, CH_3), 2.56 (m, 1H, $CH(CH_3)_2$), 3.45 (m, 2H, PCH_2P), 4.37 and 4.75 (m, 2H each, OCH_2), 5.34, 5.82, 6.09 and 6.30 (br, 1H each, CH of *p*-cymene), 6.79-7.89 (m, 25H, Ph); δ_C (CD_2Cl_2) 16.11 (d, ^3J(CP) = 6.7 Hz, OCH_2CH_3), 16.59 (s, CH_3), 16.78 (d, ^3J(CP) = 4.5 Hz, OCH_2CH_3), 18.34 (d, ^1J(CP) = 20.8 Hz, PCH_3), 18.70 (d, ^1J(CP) = 18.7 Hz, PCH_3), 21.70 and 22.94 (s, $CH(CH_3)_2$), 23.54 (dd, ^1J(CP) = 45.0 and 15.6 Hz, PCH_2P), 30.70 (s, $CH(CH_3)_2$), 66.22 (d, ^2J(CP) = 7.1 Hz, OCH_2), 66.52 (d, ^2J(CP) = 10.8 Hz, OCH_2), 92.39, 96.92 and 98.01 (s, CH of *p*-cymene), 101.73 (d, ^2J(CP) = 5.2 Hz, CH of *p*-cymene), 112.68 (s, C of *p*-cymene), 121.33-134.98 (m, Ph and C of *p*-cymene).

Compound 11: Found: C, 41.12; H, 4.08; N, 0.92. $RuC_{52}H_{59}F_{12}P_4O_2Sb_2NS{\cdot}CH_2Cl_2$ requires C, 41.24; H, 3.98; N, 0.91%; conductivity (acetone, 20°C) 207 Ω^{-1} cm^2 mol^{-1}; ν_{max}/cm^{-1} (KBr) 3061, 2978, 1484, 1437, 1391, 1266, 1163, 1110, 1095, 1026, 967, 886, 850, 739, 695, 655, 587, 515, 498; δ_P (CD_2Cl_2) 4.39 (dd, ^2J(PP) = 41.5 Hz, ^3J(PP) = 33.4 Hz, $PMePh_2$), 19.89 (dd, ^2J(PP) = 30.7 and 12.7 Hz, $Ph_2P{=}N$), 28.80 (ddd, ^2J(PP) = 41.5 and 12.7 Hz, ^3J(PP) = 10.8 Hz, Ph_2P), 51.11 (ddd, ^3J(PP) = 33.4 and 10.8 Hz, ^2J(PP) = 30.7 Hz, $(EtO)_2P{=}S$); δ_H (CD_2Cl_2) 1.09 (d, 3H, ^3J(HH) = 5.4 Hz, $CH(CH_3)_2$), 1.38 (d, 3H, ^3J(HH) = 6.7 Hz, $CH(CH_3)_2$), 1.48 (t, 3H, ^3J(HH) = 6.8 Hz, OCH_2CH_3), 1.83 (t, 3H, ^3J(HH) = 7.0 Hz, OCH_2CH_3), 1.88 (s, 3H, CH_3), 2.15 (d, 3H, ^2J(HP) = 8.9 Hz, PCH_3), 2.81 (m, 1H, $CH(CH_3)_2$), 3.20 (m, 2H, PCH_2P), 4.35 and 4.68 (m, 2H each, OCH_2), 5.46 and 5.86 (br, 1H each, CH of *p*-cymene), 6.17 and 6.68 (d, 1H each, ^3J(HH) = 5.7 Hz, CH of *p*-cymene), 7.20-7.65 (m, 30H, Ph); δ_C (CD_2Cl_2) 13.57 (d, ^1J(CP) = 11.8 Hz, PCH_3), 16.11 (d, ^3J(CP) = 8.1 Hz, OCH_2CH_3), 16.60 (d, ^3J(CP) = 7.0 Hz, OCH_2CH_3), 18.62 (s, CH_3), 20.27 and 23.18 (s, $CH(CH_3)_2$), 26.27 (dd, ^1J(CP) = 55.1 and 16.9 Hz, PCH_2P), 31.23 (s, $CH(CH_3)_2$), 66.25 (d, ^2J(CP) = 7.5 Hz, OCH_2), 66.60 (d, ^2J(CP) = 10.8 Hz, OCH_2), 92.78 (d, ^2J(CP) = 6.4 Hz, CH of *p*-cymene), 94.26 and 97.02 (s, CH of *p*-cymene), 100.96 (d, ^2J(CP) = 5.4 Hz, CH of *p*-cymene), 109.34 (s, C of *p*-cymene), 124.51-133.78 (m, Ph and C of *p*-cymene).

Compound 12: Found: C, 40.49; H, 4.18; N, 1.18. $RuC_{39}H_{46}F_6P_3O_2BrNSSb{\cdot}CH_2Cl_2$ requires C, 40.46; H, 4.07; N, 1.18%; conductivity (acetone, 20°C) 113 Ω^{-1} cm^2 mol^{-1}; ν_{max}/cm^{-1} (KBr) 3056, 2964, 2902, 1475, 1439, 1389, 1365, 1236, 1155, 1110, 1007, 953, 850, 776, 742, 657, 585, 535; δ_P (CD_2Cl_2) 15.37 (dd, ^2J(PP) = 26.3 and 4.5 Hz, $Ph_2P{=}N$), 23.99 (dd, ^3J(PP) = 11.7 Hz, ^2J(PP) = 4.5 Hz, Ph_2P), 55.39 (dd, ^2J(PP) = 26.3 Hz, ^3J(PP) = 11.7 Hz, $(EtO)_2P{=}S$); δ_H (CD_2Cl_2) 0.81 and 0.93 (d, 3H each, ^3J(HH) = 6.6 Hz, $CH(CH_3)_2$), 1.06 and 1.49 (t, 3H each, ^3J(HH) = 6.7 Hz, OCH_2CH_3), 2.06 (s, 3H, CH_3), 2.53 (m, 1H, $CH(CH_3)_2$), 3.20 and 5.15 (m, 1H each, PCH_2P), 3.92 and 4.15 (m, 2H each, OCH_2), 5.04 and 5.38 (d, 1H each, ^3J(HH) = 4.9 Hz, CH of *p*-cymene), 5.57 and 5.78 (d, 1H each,

^{3}J(HH) = 5.8 Hz, CH of *p*-cymene), 7.03-7.64 (m, 20H, Ph); δ_C (CD_2Cl_2) 15.77 and 16.37 (d, ^{3}J(CP) = 8.1 Hz, OCH_2CH_3), 18.65 (s, CH_3), 21.88 and 22.08 (s, $CH(CH_3)_2$), 28.53 (dd, ^{1}J(CP) = 58.9 and 17.4 Hz, PCH_2P), 31.21 (s, $CH(CH_3)_2$), 64.63 and 64.79 (d, ^{2}J(CP) = 8.7 Hz, OCH_2), 87.68 (s, CH of *p*-cymene), 88.04 (d, ^{2}J(CP) = 1.3 Hz, CH of *p*-cymene), 90.45 (d, ^{2}J(CP) = 6.0 Hz, CH of *p*-cymene), 94.26 (d, ^{2}J(CP) = 7.2 Hz, CH of *p*-cymene), 104.09 and 112.72 (s, C of *p*-cymene), 125.52-139.08 (m, Ph).

Compound 13: Found: C, 39.45; H, 3.87; N, 1.17. $RuC_{39}H_{46}F_6P_3O_2INSSb{\cdot}2/3CH_2Cl_2$ requires C, 39.50; H, 3.95; N, 1.16%; conductivity (acetone, 20°C) 109 Ω^{-1} cm^2 mol^{-1}; ν_{max}/cm^{-1} (KBr) 3055, 2965, 2899, 1476, 1439, 1389, 1364, 1237, 1157, 1109, 954, 859, 774, 736, 711, 657, 584, 535, 495; δ_P (CD_2Cl_2) 17.22 (dd, ^{2}J(PP) = 27.2 and 5.5 Hz, Ph_2P=N), 23.48 (dd, ^{3}J(PP) = 12.5 Hz, ^{2}J(PP) = 5.5 Hz, Ph_2P), 56.21 (dd, ^{2}J(PP) = 27.2 Hz, ^{3}J(PP) = 12.5 Hz, $(EtO)_2P$=S); δ_H (CD_2Cl_2) 0.82 and 0.84 (d, 3H each, ^{3}J(HH) = 6.4 Hz, $CH(CH_3)_2$), 1.07 (t, 3H, ^{3}J(HH) = 6.9 Hz, OCH_2CH_3), 1.55 (t, 3H, ^{3}J(HH) = 7.0 Hz, OCH_2CH_3), 2.08 (s, 3H, CH_3), 2.58 (m, 1H, $CH(CH_3)_2$), 3.35 and 5.20 (m, 1H each, PCH_2P), 3.91 and 4.20 (m, 2H each, OCH_2), 5.24 and 5.61 (d, 1H each, ^{3}J(HH) = 6.2 Hz, CH of *p*-cymene), 5.69 and 6.01 (d, 1H each, ^{3}J(HH) = 5.6 Hz, CH of *p*-cymene), 7.05-7.62 (m, 20H, Ph); δ_C (CD_2Cl_2) 15.83 and 16.45 (d, ^{3}J(CP) = 7.8 Hz, OCH_2CH_3), 18.95 (s, CH_3), 22.08 and 22.58 (s, $CH(CH_3)_2$), 30.82 (dd, ^{1}J(CP) = 58.0 and 18.3 Hz, PCH_2P), 31.56 (s, $CH(CH_3)_2$), 64.71 and 64.81 (d, ^{2}J(CP) = 7.5 Hz, OCH_2), 88.12 (s, CH of *p*-cymene), 88.30 (d, ^{2}J(CP) = 2.4 Hz, CH of *p*-cymene), 90.05 (d, ^{2}J(CP) = 4.2 Hz, CH of *p*-cymene), 92.54 (d, ^{2}J(CP) = 7.2 Hz, CH of *p*-cymene), 107.66 and 112.01 (s, C of *p*-cymene), 125.45-139.04 (m, Ph).

Compound 14: Found: C, 43.82; H, 4.51; N, 5.09. $RuC_{39}H_{46}F_6N_4P_3O_2SSb$ requires C, 44.00; H, 4.36; N, 5.26%; conductivity (acetone, 20°C) 117 Ω^{-1} cm^2 mol^{-1}; ν_{max}/cm^{-1} (KBr) 3060, 2978, 2043, 1489, 1437, 1276, 1091, 1027, 965, 848, 783, 738, 691, 643, 585, 486; δ_P (CD_2Cl_2) 13.41 (dd, ^{2}J(PP) = 29.3 and 7.3 Hz, Ph_2P=N), 30.40 (dd, ^{3}J(PP) = 7.3 Hz, ^{2}J(PP) = 7.3 Hz, Ph_2P), 52.87 (dd, ^{2}J(PP) = 29.3 Hz, ^{3}J(PP) = 7.3 Hz, $(EtO)_2P$=S); δ_H (CD_2Cl_2) 1.02 (d, 3H, ^{3}J(HH) = 7.0 Hz, $CH(CH_3)_2$), 1.07 (d, 3H, ^{3}J(HH) = 6.7 Hz, $CH(CH_3)_2$), 1.22 (t, 3H, ^{3}J(HH) = 7.2 Hz, OCH_2CH_3), 1.43 (t, 3H, ^{3}J(HH) = 7.0 Hz, OCH_2CH_3), 2.08 (s, 3H, CH_3), 2.53 (m, 1H, $CH(CH_3)_2$), 3.42 and 4.25 (m, 1H each, PCH_2P), 4.10 (m, 4H, OCH_2), 5.13 and 5.38 (d, 1H each, ^{3}J(HH) = 5.9 Hz, CH of *p*-cymene), 5.30 and 5.45 (d, 1H each, ^{3}J(HH) = 6.3 Hz, CH of *p*-cymene), 7.25-7.63 (m, 20H, Ph); δ_C (CD_2Cl_2) 15.96 (d, ^{3}J(CP) = 8.4 Hz, OCH_2CH_3), 16.29 (d, ^{3}J(CP) = 7.8 Hz, OCH_2CH_3), 18.30 (s, CH_3), 22.00 and 22.31 (s, $CH(CH_3)_2$), 26.35 (dd, ^{1}J(CP) = 58.9 and 15.0 Hz, PCH_2P), 30.68 (s, $CH(CH_3)_2$), 64.42 (d, ^{2}J(CP) = 8.4 Hz, OCH_2), 64.98 (d, ^{2}J(CP) = 7.2 Hz, OCH_2), 89.13 (s, CH of *p*-cymene), 89.55 (d, ^{2}J(CP) = 4.2 Hz, CH of *p*-cymene), 89.92 (d, ^{2}J(CP) = 3.6 Hz, CH of *p*-cymene), 93.18 (d, ^{2}J(CP) = 4.8 Hz, CH of *p*-cymene), 102.43 and 112.33 (s, C of *p*-cymene), 126.96-136.57 (m, Ph).