^{15}N AND ^{31}P NMR STUDIES OF CYANO[(TRIALKYL/TRIARYL)PHOSPHINE]GOLD(I) COMPLEXES $R_3PAu^{13}C^{15}N$

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The ligand scrambling reaction of $R_3PAuC^{15}N$ to form $(R_3P)_2Au^+$ and $Au(C^{15}N)2^-$ has been studied for R=Me, Et, i-Pr, and Ph. The reactions are studied by ^{15}N and ^{31}P NMR spectroscopy. Two ^{31}P NMR resonances were observed for R_3PAuCN and $(R_3P)_2Au^+$ species. However, for the ^{15}N NMR, only averaged resonances were observed for $R_3PAuC^{15}N$ and $Au(C^{15}N)2^-$ species except for $Et_3PAuC^{15}N$, where two resonances were detected.The $R_3PAu^{13}C^{15}N$ complexes have also been prepared where R= Me, Et, and Ph. Analysis of ^{31}P NMR of $R_3PAu^{13}C^{15}N$ (where R=Me, Et and Ph) yielded $^2J(^{31}P\text{-}^{13}C)$ values as 120.71, 122.18 and 124.57 Hz and $^3J(^{31}P\text{-}^{15}N)$ values as 3.62, 2.93 and 4.02 Hz respectively. The equilibrium constant (K_{eq}) was measured to be 0.14 between -60°C to -40°C for Ph_3PAuCN and $\Delta G^{\#}$ was determined by line-shape analysis of ^{31}P NMR peaks to be 39.7 ± 0.5 kJ/mol at 273 K.