Bis[(2-diphenylphosphino)phenyl]phenylphosphine as an Inflexible Tridentate Ligand for Indium Trichloride

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Indium Trichloride, Tridentate Phosphine, Ligand Inflexibility, Crystal Structure

Anhydrous indium trichloride reacts with $[2\text{-}(Ph_2P)C_6H_4]_2PPh$ (TP) in the molar ratio 2:1 to give an ionic complex $[(TP)InCl_2]^+$ $InCl_4^-$ in almost quantitative yield. The structure of the product has been determined by a single crystal X-ray diffraction study. In the cation the TP molecule acts only as a bidentate ligand via its two terminal phosphorus atoms [In-P1 2.5956(8), In-P2 2.5799(7) Å]. Although the central phosphorus atom is also rather close to the metal atom [2.8259(8) Å], the In-P3 interaction is inefficient because of an adverse orientation of the lone pair of electrons at P3 owing to the steric inflexibility of the ligand. Accordingly, the ^{31}P NMR spectra of the compound in CD_2Cl_2 show large contact shifts and quadrupole broadening only for the signals of the two terminal phosphorus atoms, whereas the lines of the central phosphorus atom are less shifted and well resolved (AB_2 spin system at -60°C).