

Lewis Acid Catalyzed Z to E Isomerization of 1,2-Bis(diphenylphosphino)ethene

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Z-1,2-Bis(diphenylphosphino)ethene, $\text{cis-Ph}_2\text{PCH=CHPh}_2$, forms 1:2 adducts with GaBr_3 and GaI_3 , the former of which has been identified in an X-ray diffraction study as the complex of the isomerized ligand, $\text{E-Ph}_2\text{PCH=CHPh}_2$. The GaI_3 complex is believed to be analogous on the basis of analytical and spectroscopic data. InBr_3 affords a 1:1 complex with an ionic structure $[(\text{Ph}_2\text{PCH=CHPh}_2)_2\text{InBr}_2]^+ [\text{InBr}_4]^-$ in which the cation contains the original *cis*-ligand. With InI_3 also a 1:1 adduct is obtained, where the metal triiodide unit is attached to only one phosphorus atom of the non-isomerized (*cis*) ligand in the solid state. There is rapid site exchange of the InI_3 unit in chloroform solution as followed by NMR spectroscopy. - The metal halide induced Z/E isomerization of $\text{Ph}_2\text{PCH=CHPh}_2$ has been studied in various solvents and at variable temperature with stoichiometric and catalytic amounts of AlX_3 and GaX_3 Lewis-acids. InX_3 compounds proved ineffective ($\text{X} = \text{Cl, Br, I}$). Anhydrous AlBr_3 was found to be most efficient, giving a 90% Z/E conversion in 10 min at 100°C in toluene. A mechanism is proposed which is compatible with the experimental data.

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