Supporting information for: Activation of gaseous PH₃ with low coordinate diaryltetrylenes

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Figure S-15: ORTEP diagrams of the solids-state structure of **1** highlighting the disorder of the germanium and phosphorus atoms (91:9 A:B occupancy ratio). Ellipsoids are drawn to 50% probability and all hydrogen atoms are shown.



Figure S-1: Proton NMR spectrum of compound 1 showing the presence of the GeAr₂H₂ impurity ($\delta_{\rm H} = 4.62 \text{ GeH}_2$; 25% relative to 1). Insets show the hydride signals of 1.



Figure S-2: Phosphorus-31 NMR spectrum of compound 1



Figure S-3: Proton coupled phosphorus-31 NMR spectrum of compound 1



Figure S-4: FT-IR spectrum of compound **1** showing the presence of the GeAr₂H₂ impurity ($v = 2115 \text{ cm}^{-1}$)



Figure S-5: Full and zoomed stack plots of the Phosphorus-31 NMR spectra (top: proton decoupled, bottom: proton coupled) of the crude reaction mixture of GeAr₂ and phosphine.



Figure S-6: Phosphorus-31 NMR spectrum of the redissolved solids from the crude reaction mixture of GeAr₂ and phosphine showing the ratio of the products.



Figure S-7: Proton NMR spectrum of the crude solids containing both compound **3** and **4** after attempted separation. Insets show hydride signals attributable to compound **3**.



Figure S-8: Phosphorus-31 NMR spectrum of the solids obtained after attempted separation of 3 and 4 from crude reaction mixture of SnAr₂ and phosphine.



Figure S-9: Proton coupled phosphorus-31 NMR spectrum of the solids obtained after attempted separation of **3** and **4** from crude reaction mixture of $SnAr_2$ and phosphine.

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STANDARD CARBON PARAMETERS Sample Name: Data Collected on: nmrrh400.chem.uwo.ca-Archive directory: Sample directory: FidFile: PHOSPHORUS Pulse Sequence: PHOSPHORUS (s2pul) Solvent: cdcl3 Data collected on: Oct 31 2011 Temp. 24.9 C / 298.1 K Operator: Ragogna operator: Ragoma Relax. delay.1.680 tec Pulse 45.0 degress Ville 45.0 degress Ville ABABAS 5 Mr Ville ABABAS 5 Mr 116 repetition Decoupt 11, 395.761248 Hez Pour 38 de Decoupt 11, 395.761248 Hez Vall2-Lime broadening 8.5 Hez To 522 131072 Coult 11m0 7 alor 27 sec

Figure S-10: Phosphorus-31 NMR spectrum focused on the signal attributed to compound **4** highlighting the tin-117 and tin-119 satellites



Figure S-11: Phosphorus-31 NMR spectrum focused on the signal attributed to compound **3** highlighting the tin-117 and tin-119 satellites



Figure S-12: Full and zoomed stack plots of the Phosphorus-31 NMR spectra (top: proton decoupled, bottom: proton coupled) of the solids obtained after attempted separation of **3** and **4** from the crude reaction mixture of $SnAr_2$ and phosphine.



Figure S-13: Phosphorus-31 NMR spectrum of the redissolved solids from the crude reaction mixture of SnAr₂ and phosphine showing the ratio of the products.



Figure S-14: Full and zoomed stack plots of the Phosphorus-31 NMR spectra (top: proton decoupled, bottom: proton coupled) of the crude reaction mixture of GeAr₂ (top two spectra) and SnAr₂ (bottom two spectra) with phosphine.



Figure S-15: ORTEP diagrams of the solids-state structure of **1** highlighting the disorder of the germanium and phosphorus atoms (91:9 A:B occupancy ratio). Ellipsoids are drawn to 50% probability and all hydrogen atoms are shown.