Synthesis of Cationic Bis(Phosphine)-Cobalt(I) and (III) Complexes

Lauren Ehehalt, Marcus E. Farmer, Tyler P. Pabst, and Paul J. Chirik*
Department of Chemistry, Princeton University, Princeton, New Jersey 08544
Funded by Center for Health and Wellbeing (CHW) under the Global Health Program

Importance of Cobalt in Catalysis
- Earth abundant, low cost transition metal
- 1st row transition metals offer novel pathways to product formation that 2nd and 3rd row transition metals do not
- Cationic P,Co(I) complexes have been previously proposed as active catalysts but have rarely been observed or isolated

Co(II)/Zn Catalyzed [2+2] Cycloaddition

Selective Co(II)/Zn Catalyzed [4+2] Annulation

Enantioselective Co(II)/AlMe₃ Catalyzed [2+2] Cycloaddition
Pagas, V. V.; RajanBabu, T. V. Science 2018, 367, 66–72

Alkene Hydrogenation by Co(I) Pre-Catalysts

Future Utility of Bis(phosphine) Co(I) Complexes
- Air-stable cationic Bis(phosphine) Co(III) complexes have been isolated via a general synthesis and characterized by ¹H and ³¹P NMR spectroscopy and X-Ray crystallography.
- A simple reduction method with HBPin has been developed to give the desired Bis(phosphine) Co(I) arene.
- These complexes contain varying bite angles which may correlate with selectivity of product formation in future Co-catalyzed reactions.

Future Role of Bis(Pivalate) Co(III) Complexes
- Reduction to Cationic Co(I) occurs at RT

Summary of Findings
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Acknowledgements
- Chirik Group, Princeton University Department of Chemistry, Global Health Senior Thesis Research Fund, Princeton Office of Undergraduate Research (OUR) Round Table Fund (L.E.)
- GlaxoSmithKline (M.E.F.)