

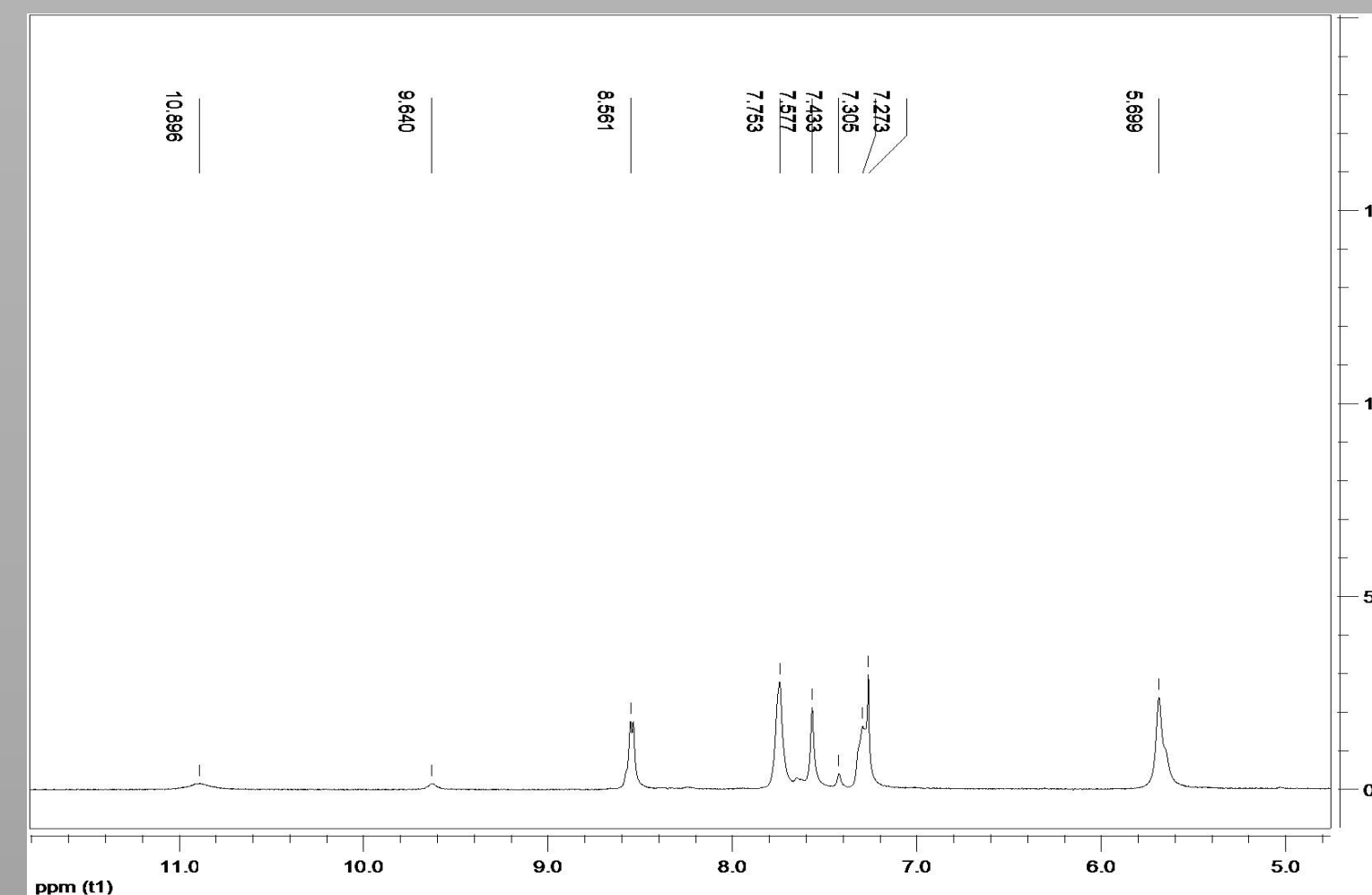
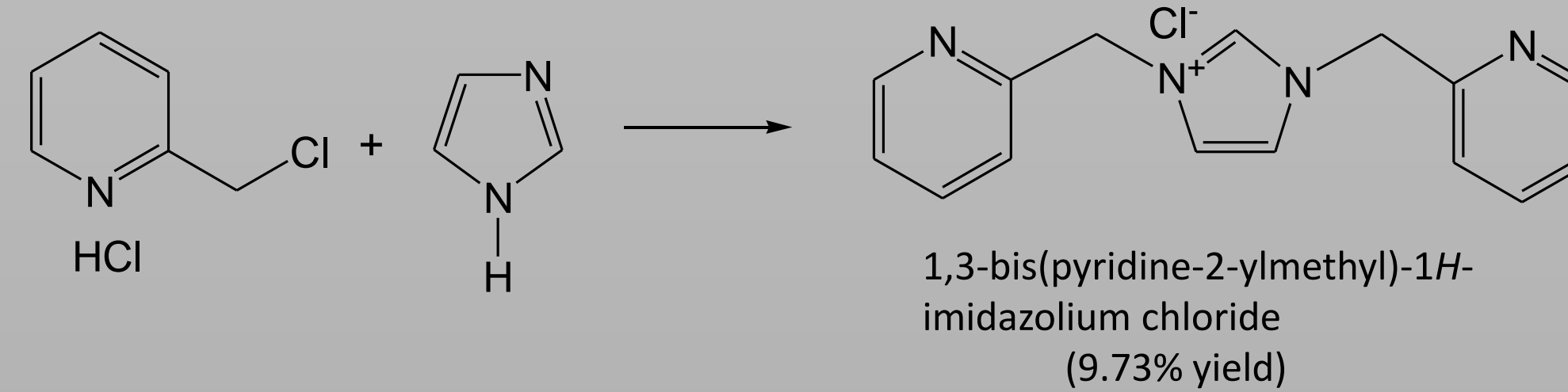


NHC-ligated Manganese(I) Compounds for Transfer Hydrogenation

Nicole V. Del Re and James F. Dunne

Ligand Design and Synthesis:

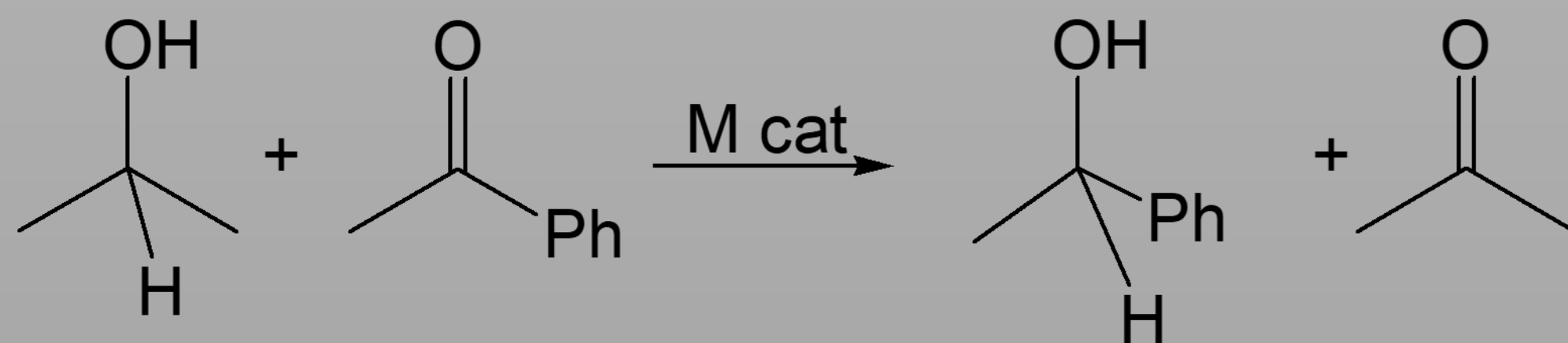
- N-Heterocyclic carbene



NHC-Mn(CO)₅Br crystal grown in DCM and Hexane vial. Sent for further analysis.

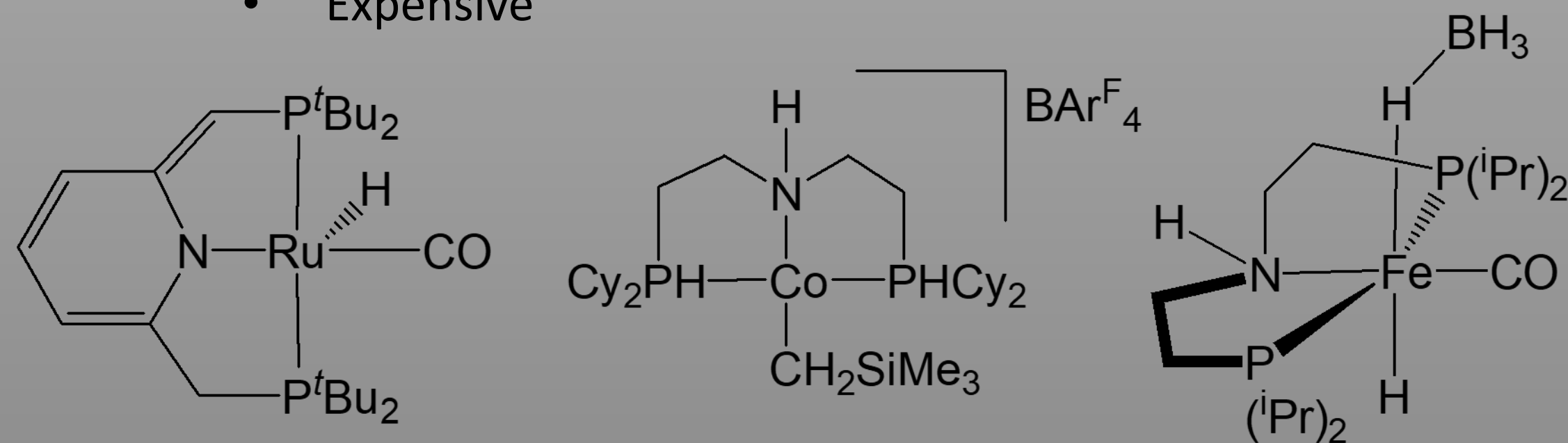
Background:

- Transfer Hydrogenation is the addition of hydrogen to a molecule using a non-hydrogen gas source.
- Some advantages to this technique are:
 - cheap starting materials
 - easy to handle



Known Catalyst:

- Started with late transition metals
 - Expensive



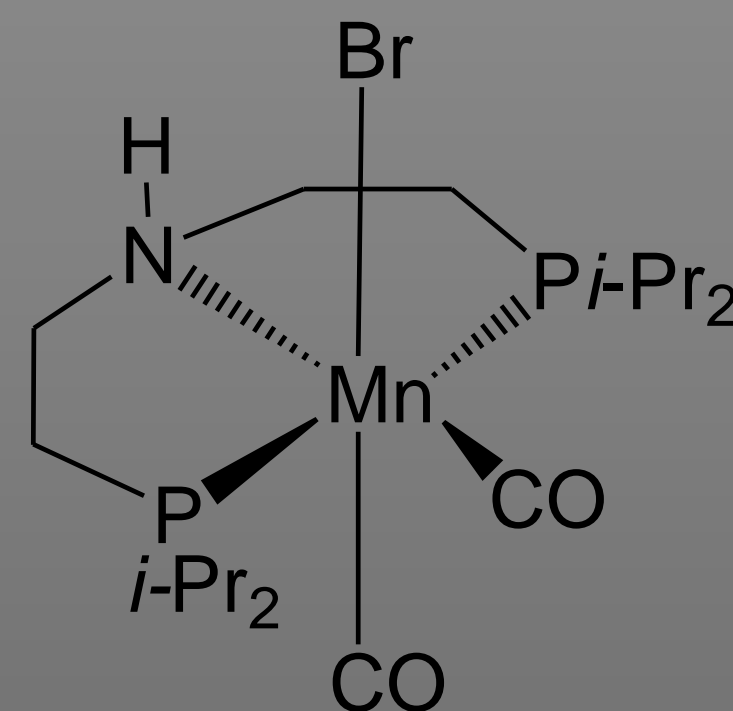
Hanson and co-workers. *Org. Letters*. **2013**, *15*, 651.

Milstein and co-workers. *Angew. Chem. Int. Ed.* **2010**, *49*, 1468.

Jones and co-workers. *ACS Cat.* **2014**, *4*, 3994.

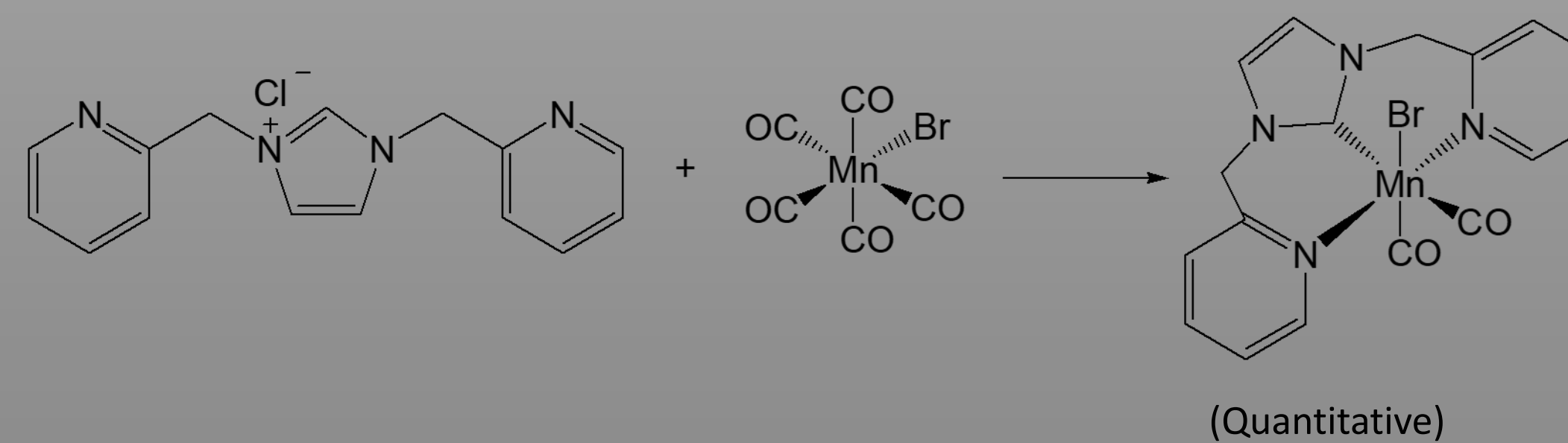
Manganese Catalyst:

- New 2016
- Earth abundant metals
 - Newer research
 - Non-toxic
 - Cheap
 - Sustainable



Beller. *Angew. Chem. Int. Ed.* **2016**, *55*, 15364.

Metallation:

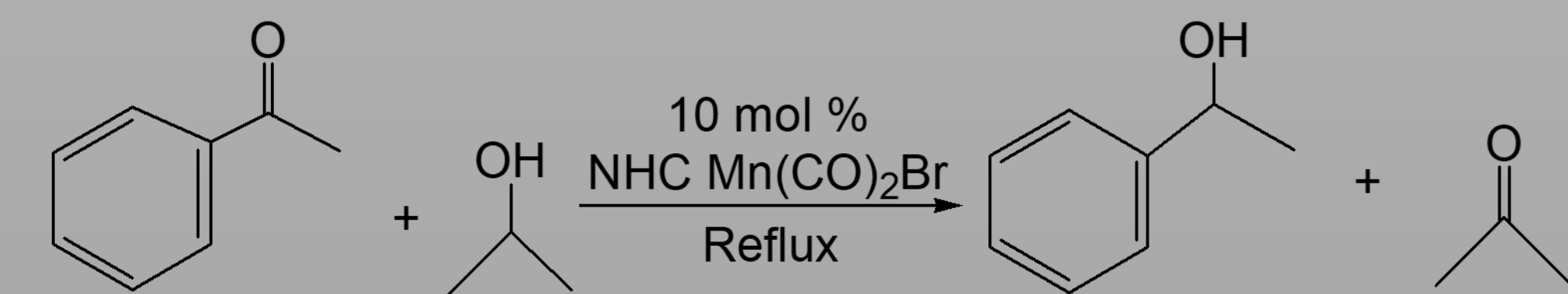


IR Stretches:

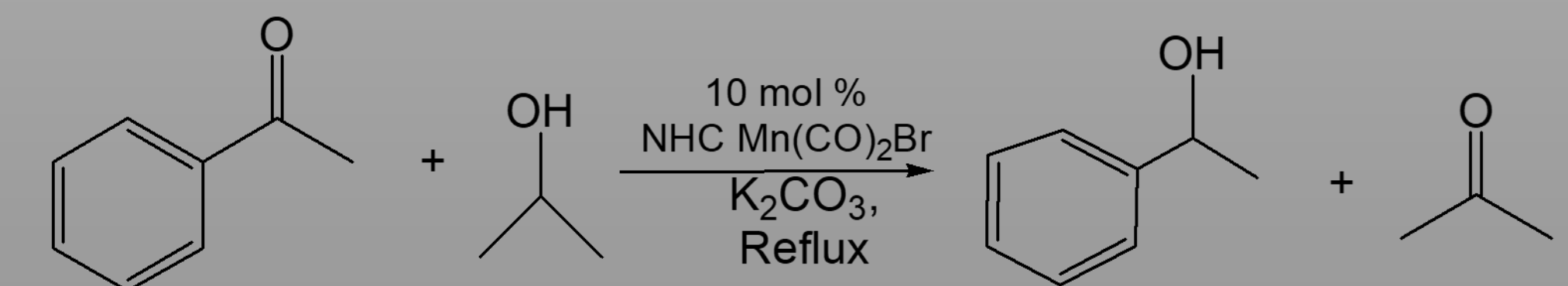
Compound	$\nu_{C=N}$ (cm ⁻¹)	$\nu_{C=O}$ (cm ⁻¹)
Mn ₂ (CO) ₁₀	----	2030, 2007, 1981
Mn(CO) ₅ Br	----	2043, 2013, 1990
NHC ligand	1596, 1563	----
NHCMn(CO) ₃	1599, 1560	1990
NHCMnBr(CO) ₂	1593, 1565	1995, 1978, 1964

Attempted Transfer Hydrogenation:

- Neutral Conditions

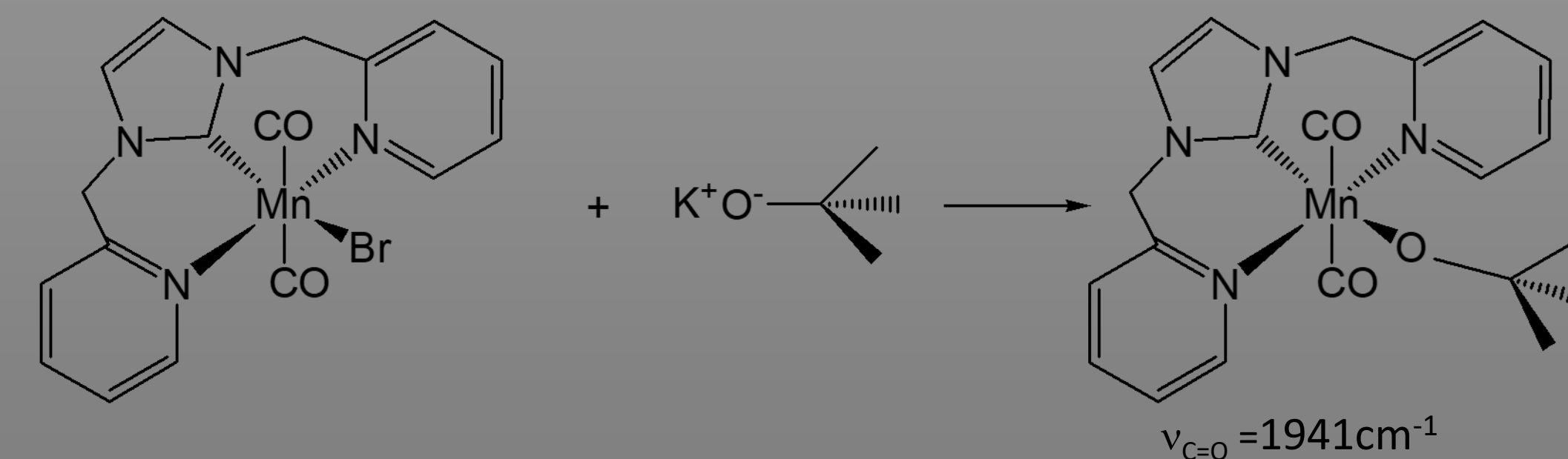


- Basic Conditions



- TLC analysis shows only starting materials

Salt metathesis of tert-butoxide:



Future Work:

- Attempt transfer hydrogenation with KOiPr