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Ketone Hydrosilylation Studies Using a Carbodiphosphorane Catalyst

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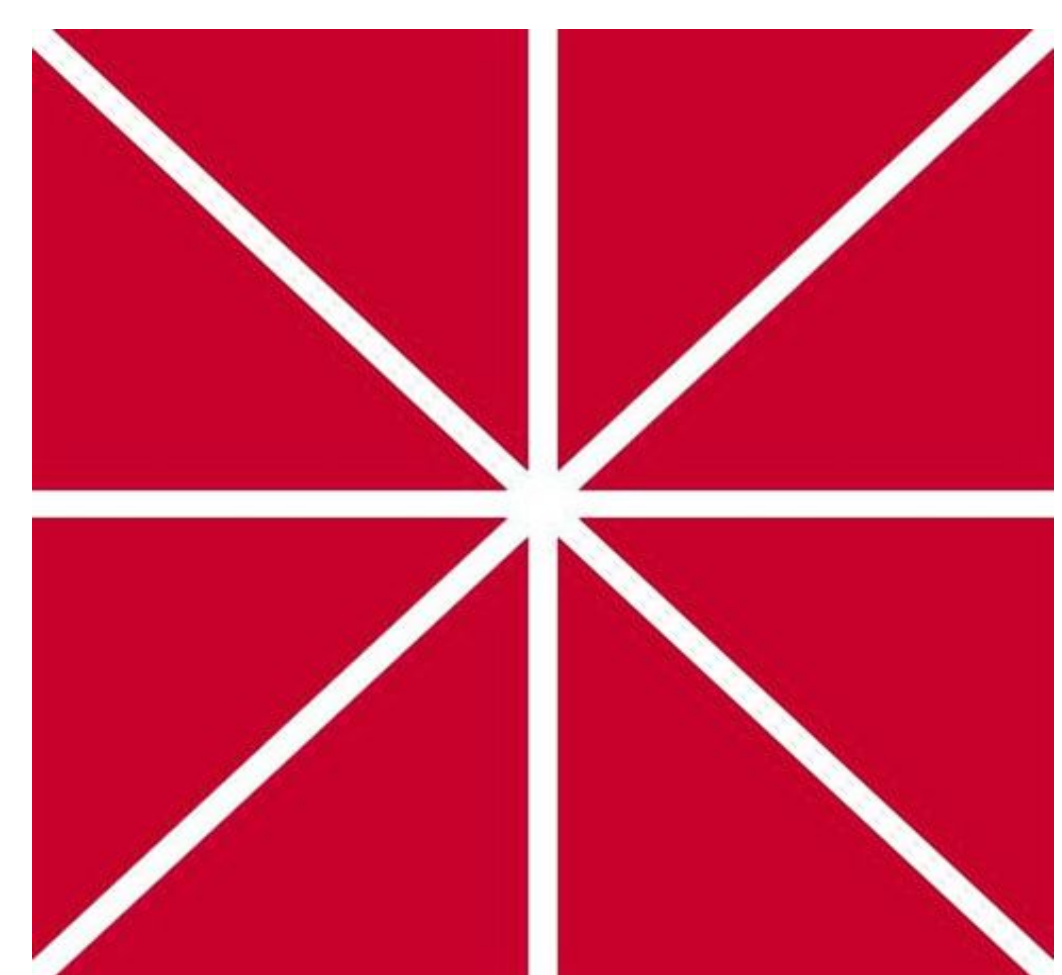
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Ketone Hydrosilylation Studies Using a Carbodiphosphorane Catalyst

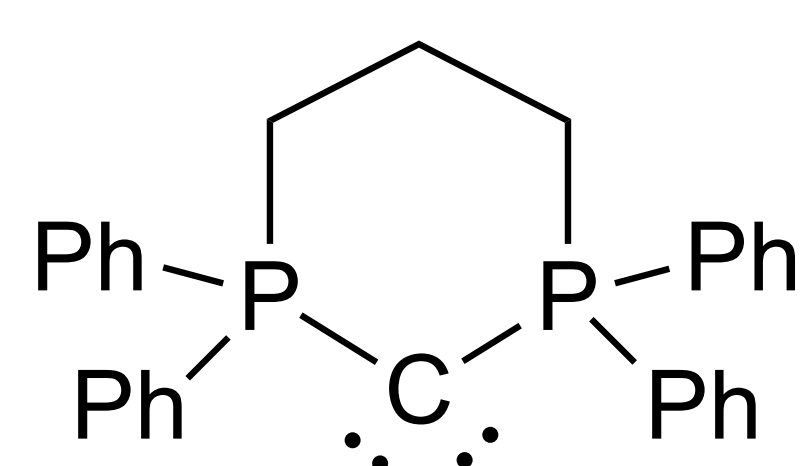
Liam Sullivan, Dr. Allegra Liberman-Martin

Schmid College of Science and Technology, Chapman University

Background

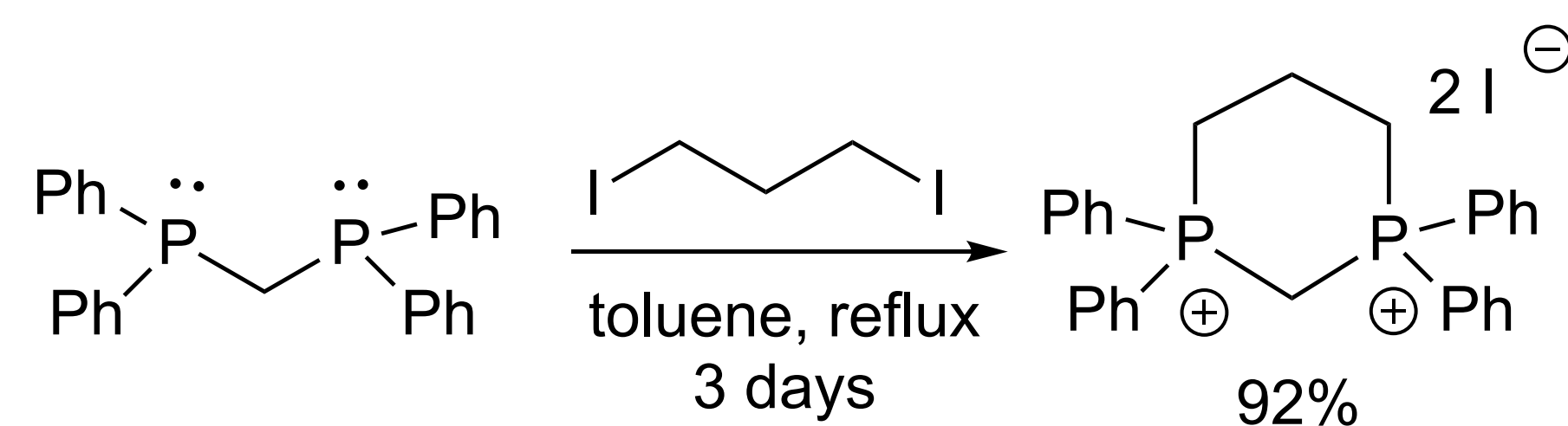
Ketone hydrosilylation is used for the synthesis of alcohol products.

We are investigating a carbodiphosphorane catalyst as a metal-free nucleophilic organic catalyst.

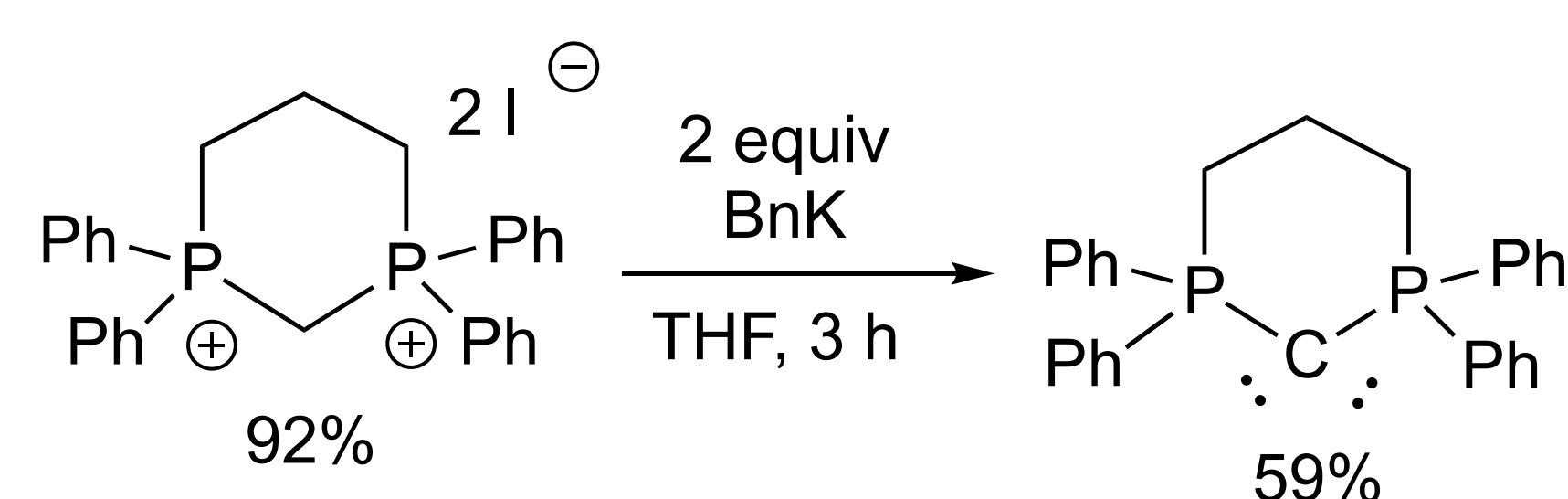


Catalyst Synthesis

Alkylation:

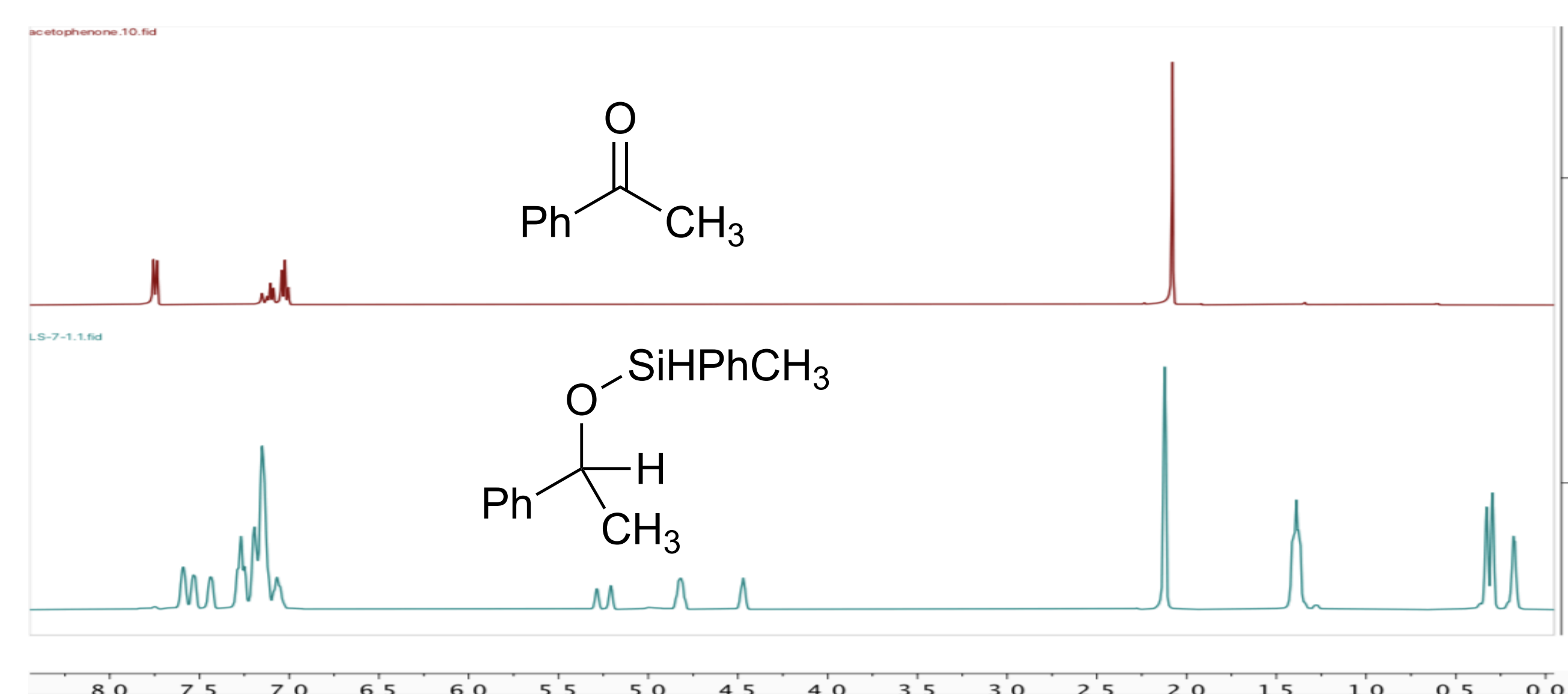


Deprotonation:

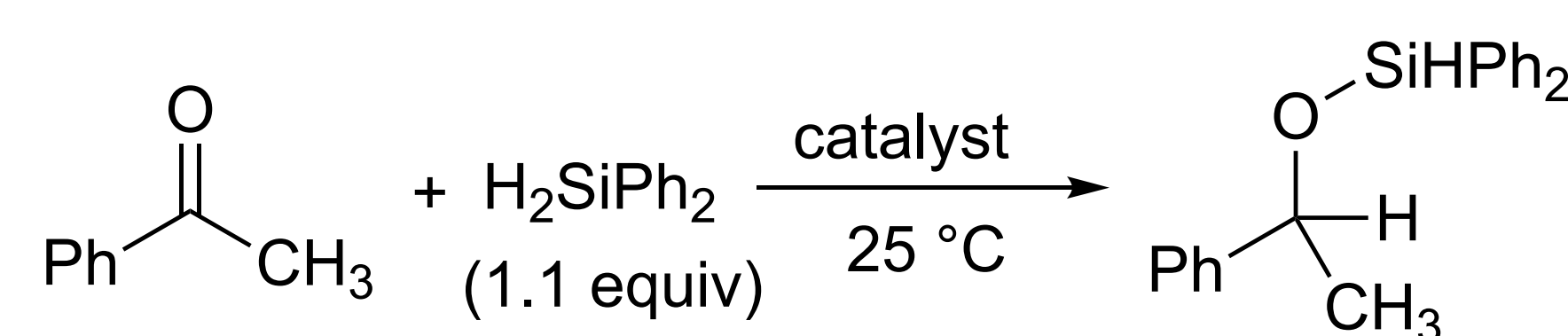


Methodology

¹H NMR spectra of the starting ketone were compared to hydrosilylation products to determine the conversion.

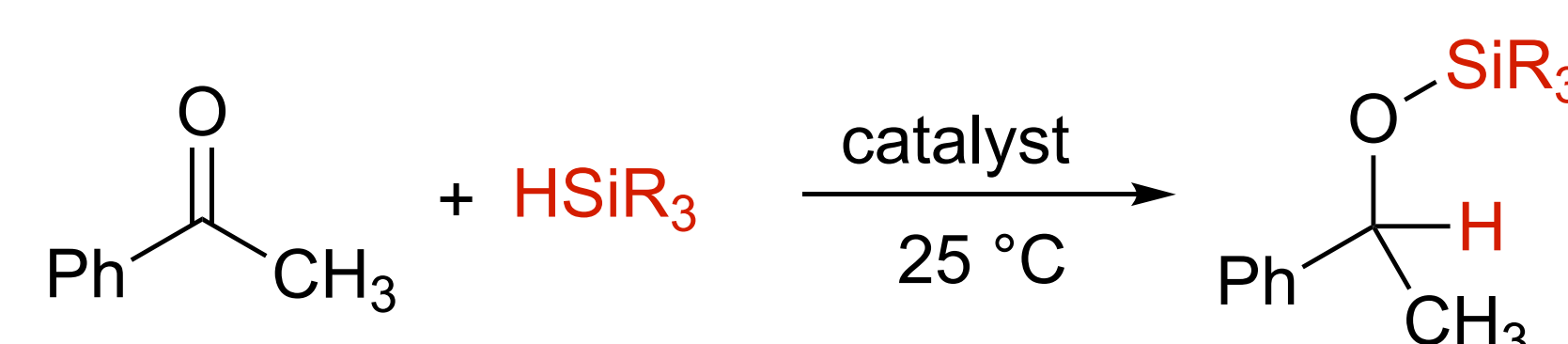


Nucleophilic Catalyst Comparison



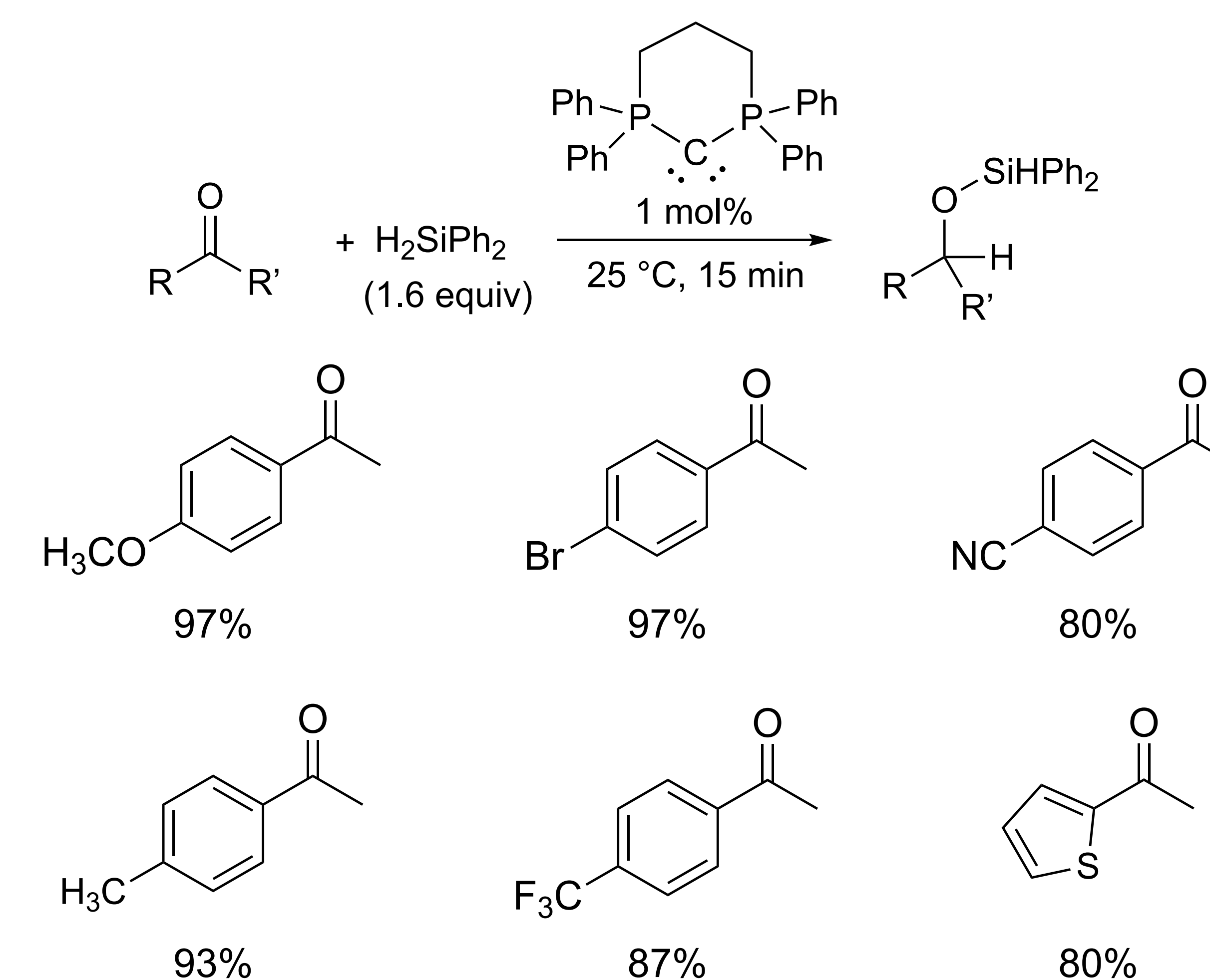
Catalyst	Catalyst Loading	Time	Conversion
	5 mol% 1 mol%	1 h	94% ± 1% 92% ± 1%
	5 mol% 1 mol%	1 h	100% ± 1% 25% ± 11%
	5 mol%	1 h	53% ± 13%
	5 mol%	1 h	6% ± 0.5%
	5 mol%	1 h	8% ± 2%

Silane Scope



Silane	Conversion
H ₃ SiPh	89%
H ₂ SiPh ₂	97%
HSiPh ₃	73%

Ketone Scope



Full ketone substrate scope:



References

- (1) Wang, Z.; Fetterly, B.; Verkade, J. G. P(MeNMCH₂CH₂)₃N: An Effective Catalyst for Trimethylsilylcyanation of Aldehydes and Ketones. *Journal of Organometallic Chemistry* **2002**, *646*, 161–166.
- (2) Wang, Z.; Wroblewski, A. E.; Verkade, J. G. P(MeNCH₂CH₂)₃N: An Efficient Promoter for the Reduction of Aldehydes and Ketones with Poly(Methylhydrosiloxane). *J. Org. Chem.* **1999**, *64*, 8021–8023.
- (3) Wu, W.-B.; Zeng, X.-P.; Zhou, J. Carbonyl-Stabilized Phosphorus Ylide as an Organocatalyst for Cyanosilylation Reactions Using TMSCN. *J. Org. Chem.* **2020**, *85*, 14342–14350.

Acknowledgements

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