

University of Missouri, St. Louis

IRL @ UMSL

Undergraduate Research Symposium

UMSL Undergraduate Works

January 2024

Etherification of Propargylic Alcohol using Ferrocenium Ions

Cody Amann
cdawf2@umssystem.edu

Sai Anvesh Bezawada
sbq3q@umsl.edu

Eike B. Bauer
bauere@umsl.edu

Follow this and additional works at: <https://irl.umsl.edu/urs>

 Part of the [Organic Chemistry Commons](#)

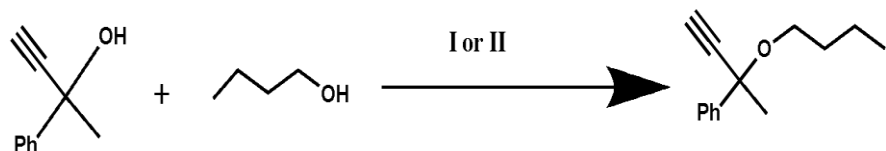
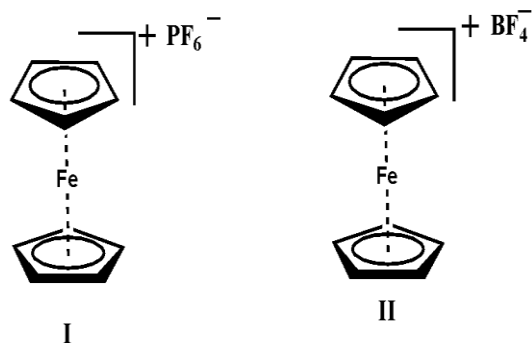
Recommended Citation

Amann, Cody; Bezawada, Sai Anvesh; and Bauer, Eike B., "Etherification of Propargylic Alcohol using Ferrocenium Ions" (2024). *Undergraduate Research Symposium*. 154.
Available at: <https://irl.umsl.edu/urs/154>

This Article is brought to you for free and open access by the UMSL Undergraduate Works at IRL @ UMSL. It has been accepted for inclusion in Undergraduate Research Symposium by an authorized administrator of IRL @ UMSL. For more information, please contact marvinh@umsl.edu.

Introduction:

- Ferrocenium cations are widely used as catalysts.
- Our research involves improving iron-based catalyst systems by comparing the effect of two different counteranions of the ferrocenium cation on the catalytic activity.
- The two different counteranions used were hexafluorophosphate (I) and tetrafluoroborate (II).
- Etherification tests were performed using equimolar amounts of a propargylic alcohol and the primary alcohol *n*-butanol in CH₂Cl₂ at 40 °C with an increasing amount of catalyst load.
- The formation of the propargylic ether product was analyzed by using gas chromatography in 2 h and 18 h intervals.
- An increase in ether formation occurred as catalyst load increased.



GC after 2 hours:

%Load	FcPF ₆	FcBF ₄
1%	3.4% ± 1.4%	2.70% ± 1.00%
2%	11.10% ± 1.10%	9.20% ± 2.70%
3%	30.5% ± 24.7%	17.5% ± 11.5%
4%		
5%		
10%		

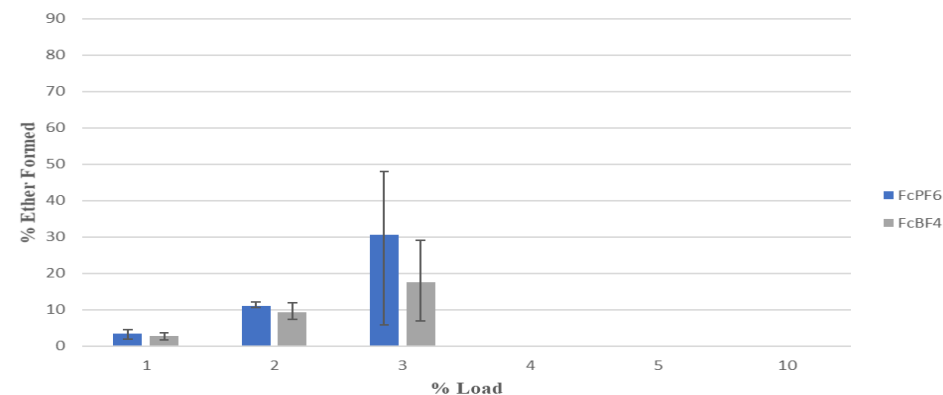
GC after 18 hours:

%Load	FcPF ₆	FcBF ₄
1%	15.2% ± 3.20%	9.20% ± 2.10%
2%	37.6% ± 6.75%	32.6% ± 7.70%
3%	46.2% ± 32.5%	49.1% ± 18.1%
4%		
5%		
10%		

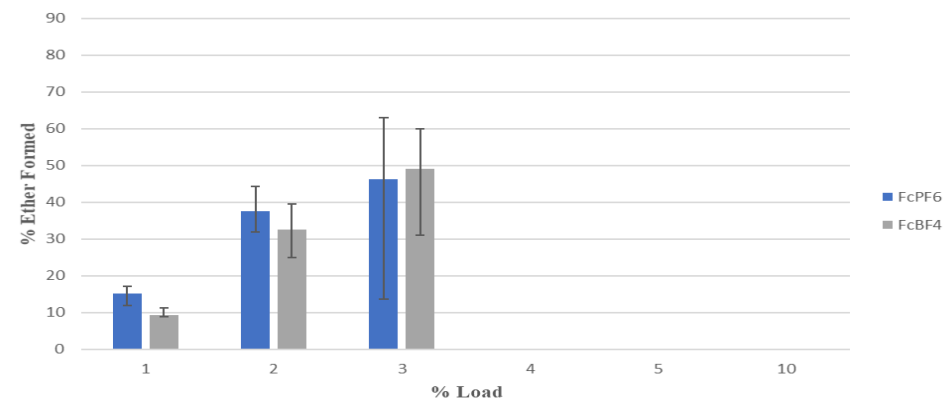
Key Findings:

Increasing the catalyst load has a direct effect in increasing the amount of ether formed. After 2 hours, only a small percent of ether is formed. After 18 hours, there is a significant increase in the amount of ether formed.

Amount of Ether Formed for Increasing % Load (2h)



Amount of Ether Formed for Increasing % Load (18h)



Acknowledgment and References:

Support of this research by funds from the Banavali Green and Sustainable Chemistry Fund in Arts and Science at University of Missouri – Saint Louis is gratefully acknowledged.