Towards the Synthesis of 1,3,5,7-Tetraethynyladamantane
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Abstract
The synthesis of 1-ethynyladamantane from adamantane 1-carboxylic acid was investigated as a model for the total synthesis of 1,3,5,7-tetraethynyladamantane. Three synthetic routes were explored to determine the most efficient pathway for terminal alkyne production. The reaction scheme that proved to be most successful involves a Corey-Fuchs conversion of an aldehyde to the desired alkyne product.1

Introduction
The only known published synthesis of 1,3,5,7-tetraethynyladamantane was performed by Nakazaki in 8 steps with an 18% yield.2 The molecule under investigation is a useful building block in the formation of 3-dimensional networks due to the terminal alkyne coupling sites. Tetrasubstitution can be achieved through ultraviolet light induced free radical acylation of the tertiary carbons, shown in Scheme 1.3 For practical purposes, 1-ethynyladamantane was used as a model for the complete synthesis, shown in Schemes 2 and 3.

References

Results & Discussion
• Synthesis of 7 was performed successfully but with low yield. Attempts to convert 7 to 8 with n-butyllithium and sodium hydride to date has been unsuccessful.
• In Scheme 3, 9 was synthesized with a 67% yield. Efforts to convert to 10 or 11 using Grignard reagents have not resulted in product formation.
• Bromomethylphenyl sulfone was synthesized with a 25% yield to be used in the production of 11.

Conclusion
The synthesis in Scheme 2, despite not yielding the final product, is the most promising of the three. Further investigation and experimentation is required; however, this is the most reasonable synthesis to attempt to produce 1 by. The next step is to investigate alternative bases to n-butyllithium to promote the elimination reaction.

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