Synthesis of Novel Sulfur–Based Heterocycles for Biological Activity Testing

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Introduction

- The purpose of this study is to characterize two novel compounds, (6A or 6B) and test them for biological activity.
- Thiophene (1A) and benzothiophene (1B) are the key starting materials in this reaction. They have been the focus of Dr. Noland’s most recent research on organic heterocyclic compounds.
- Several compounds previously made by Dr. Noland’s research group have been tested by the Developmental Therapeutics Program at the National Cancer Institute and shown biological activity against viruses (HIV-1) as well as lung, skin, bone, and breast cancers.
- Submitting novel compounds for biological activity has true anonymity, the purpose of this experiment was to try to add two more sulfur–containing compounds that would show biological activity against the viruses and diseases listed above.

Reaction Description

- Reaction (1A or 1B) to (3A or 3B) is a nucleophilic addition reaction to the carbonyl carbon of 2–acetylthiophene (2).
- The Diels–Alder reaction, shown in proposed mechanism (3A or 3B) to (6A or 6B), is used to make six–membered rings. This reaction was used in a single step by trapping the olefin compound (4A or 4B).

Research Applications

- This research has helped complement other reactions using thiophene and benzothiophene by furthering our understanding of these types of heterocyclic compounds.
- Dr. Noland’s lab continues to work on these compounds trying different ketones groups to add to thiophene and benzothiophene.

Conclusions

- One novel compound has been successfully characterized (3B).
- Compounds (6A) and (6B) have been made, but are not yet fully purified and characterized.
- All compounds have been made, 1 out of the 3 novel compounds is characterized.
- After (6A) and (6B) have been fully characterized, they will be submitted and tested for biological activity.
- The new method of trapping the olefin compound (4A or 4B) to complete a Diels–Alder reaction in one step is a new technique for Dr. Noland’s research.

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