Photoconversion of 1,2,3-triazoles to indoles

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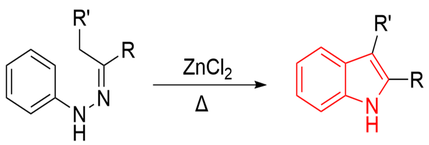
FSU CHEMISTRY & BIOCHEMISTRY

Background

Indoles:

- An Indole is an aromatic, bicyclic compound that is a valuable core structure for pharmaceutical candidates.
- Existing Synthesis of Indoles:

- **Fischer Indole Synthesis**

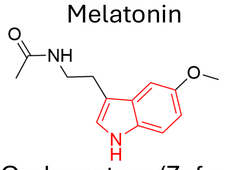


Pros
- Broad Scope
- Simple and Cost Effective

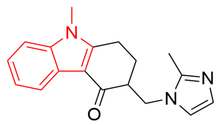
Cons
- Harsh Reaction Conditions

Examples of Indoles

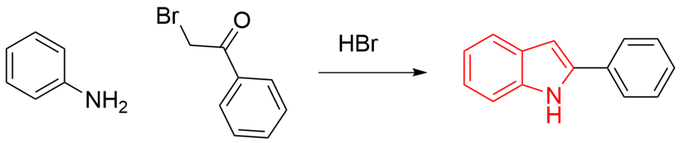
Melatonin



Ondansetron (Zofran)



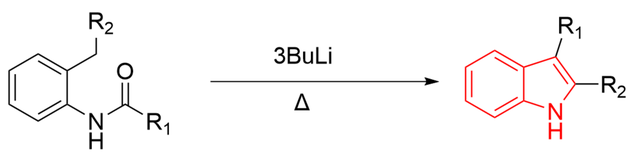
- **Bischler-Möhlau Indole Synthesis**



Pros
- Allows for phenyl substituted indoles
- Does not require Hydrazines

Cons
- Harsh Reaction Conditions (strong acids and high temperatures)
- Poor Yields (20-50%)

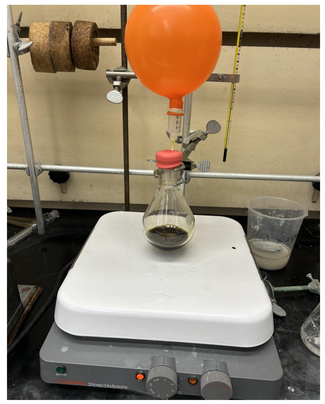
- **Madelung Synthesis**

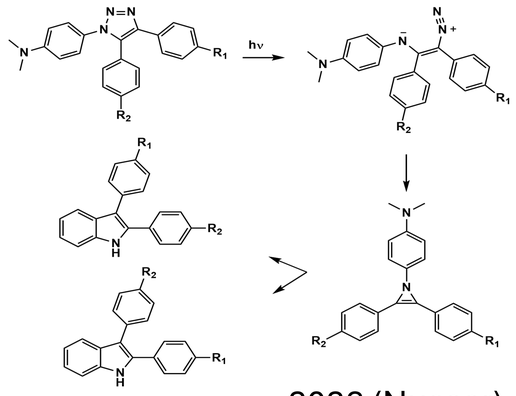


Pros
- Allows for selectivity of substituents

Cons
- Harsh Reaction conditions (strong base, high temperatures)
- Electron-Withdrawing Groups and Sterics hinder reactivity

What Our Group Found



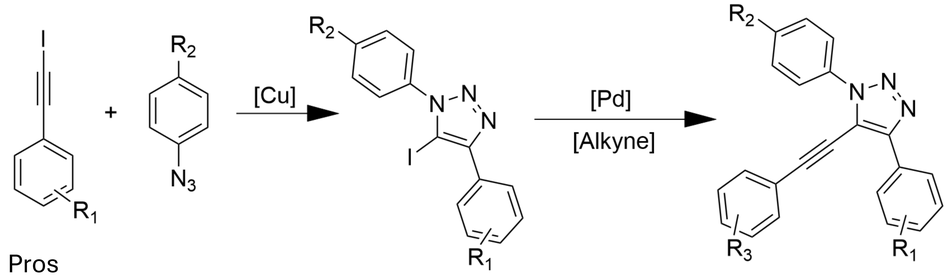


2023 (Nusser)

Expanding the methods for indole synthesis
- Two possible regioisomeric products through photochemistry
  - Plenty triazole starting materials are available owing to the recent developments of triazole syntheses.

My Target – Photochemistry of 5-Alkynyltriazoles

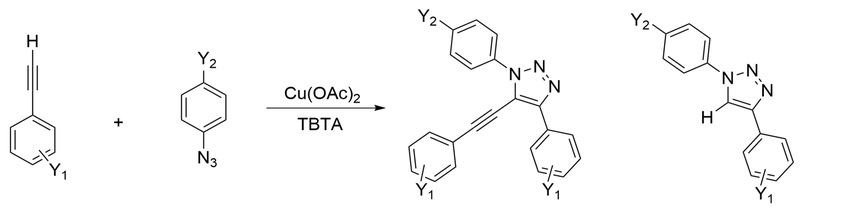
- **Through a stable Iodo-triazole intermediate**



Pros
- Allows for more selective substituents

Cons
- Low Yields
- Harsh Reaction Conditions (reflux, strong base)

- **Liu's Oxidative Formation of 5-Alkynyl Triazoles**



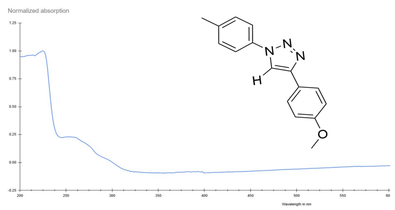
Pros
- Higher Yields
- Shorter synthesis

Cons
- Less selective for substituents
- Produces protio-triazole byproducts

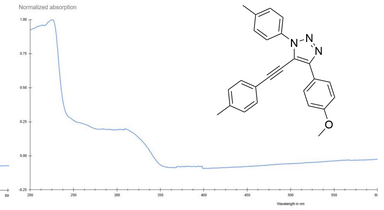
Photochemistry

We choose the irradiation source based on the absorption of the triazole

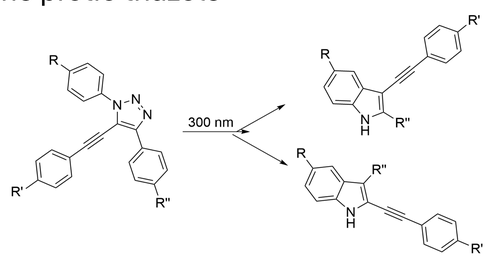
254-nm/300-nm bulbs



300-nm bulbs



Preliminary Results:
- Alkynyl triazole was found to be more reactive than the protio triazole



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