June 21, 2024

Group Meeting Problem Set

**Synthesis is fun!?**

1. Strychnine is a highly toxic alkaloid extracted from the seeds of Strychnos nux-vomica tree. In the past, strychnine found use as a poison, pesticide, medicine and occasional performance enhancing drug. Despite these uses, the exact structure of strychnine was not determined until 1946.

The complexity of strychnine has cemented its place as a perennial synthetic target. The 7-ring system and difficulty in setting contiguous stereocenters has made it a highlight of synthetic determination, ingenuity, and efficiency.

Shown below is a common, two dimensional representation of (-)strychnine. To the best of your ability, draw a 3-dimensional conformer that effectively conveys the overall structure of strychnine.



Provided are three intermediates found in three different syntheses of strychnine. In teams of 2–3, perform a retrosynthetic analysis of strychnine towards the shown intermediates.



3. The synthesis of substituted *N*-heteroarenes is a highly valuable branch of synthetic chemistry. The cyclization of linear substrates to form the desired ring allows for construction of highly functionalized starting materials from simple, widely accessible pools of starting materials. Shown below is the synthesis of a tosyl-protected 3,4-disubvstituted pyrrole. Propose a mechanism for this transformation.



References:

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4. Shapless, K. B. *J. Org. Chem.* **2001**, 66, 594–596
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