

TITLE: Synthesis of *trans*-Cyclooctene for DNA modification

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Introduction: DNA modification can be explored for various applications, one of which is aptamer selection. Aptamers are short single-stranded DNA or RNA molecules that can specifically bind to other molecules such as proteins, cells, and tissues. They can be selected through *in vitro selection*. In our studies, we have synthesized *trans*-cyclooctene modified thymidine nucleotides which will be used for post-PCR modification and DNA aptamer selection.

Methods: Photochemical synthesis was used to convert *cis*-cyclooctene into *trans*-cyclooctene under UV light and appropriate conditions. Through column chromatography and thin-layer chromatography (TLC), *trans*-cyclooctene was purified and then subjected to subsequent reactions prior to its attachment to thymidine. The final product, *trans*-cyclooctene modified thymidine triphosphate, was purified by high performance liquid chromatographic (HPLC) and ion exchange chromatography.

Results: Through the aforementioned chromatographic purification processes, product from each step was purified and the used in subsequent reactions until the final product was obtained. The final product was purified and confirmed by ^1H NMR, ^{13}C NMR, and ^{31}P NMR spectroscopy and mass spectrometry.

Conclusion: The purpose of this experiment was to synthesize *trans*-cyclooctene modified thymidine triphosphate. The target *trans*-cyclooctene was successfully synthesized and characterized. It will be used in post-PCR DNA modification and research on DNA aptamer selection.