

Paper #3 – “Highly Selective Diels-Alder Reactions of Dienophiles with 1,3-Cyclohexadiene Mediated by $\text{Yb}(\text{OTf})_3 \cdot \text{H}_2\text{O}$ and Ultrahigh Pressures” by A.C. Kinsman & M.A. Kerr, *Org. Lett.*, **2000**, 2(22), 3517-3520 (DOI [10.1021/ol0065773](https://doi.org/10.1021/ol0065773)).

The same routine: read for two levels (at least!) of understanding. I have marked terminology (basic understanding) in this paper, but I want you to develop your own ideas of what the more advanced scientific issues might be.

Once again, I would like you to prepare a short written document to bring to class. It will be due in class, Friday, Feb 13. The assignment consists of two separate tasks:

1. In 250 words or less,
 - a. formulate this paper as a piece of *discovery/data*-driven research, i.e., explain what *discover/data* the chemists were pursuing;
 - b. re-formulate this paper as a piece of *hypothesis*-driven research, i.e., state a hypothesis that the chemists were trying to test (or, state a question that they were trying to answer). Ideally, faced with this hypothesis, the authors would have performed some or all of the experiments in the paper.
2. In 100 words or less (total!), state 3 scientific questions that you would put to students if you were trying to get students to read this paper at an advanced level.

Background Reading

Paper #3 examines the effects of Lewis acid catalysis and high pressure on a Diels-Alder reaction. Background readings on high pressure Diels-Alder are provided below. The first article is a review article and need not be read in its entirety (13 pages). However, you should read enough so that you become familiar with the idea of “volume of activation” and so that you can see how to translate this into the pressure-dependence of a reaction rate constant. The second and third articles are very short and illustrate some (of the first) examples of pressure-dependent Diels-Alder chemistry.

- G. Jenner, “High-Pressure Mechanistic Delineation Based on Activation Volumes,” *J. Phys. Org. Chem.* **2002**, 15, 1-13; DOI [10.1002/poc.458](https://doi.org/10.1002/poc.458)
- H. Kotsuki, et al., “High Pressure Organic Chemistry. 2. Diels Alder Reaction of Thiophene with Maleic Anhydride at Very High Pressure,” *J. Org. Chem.* **1978**, 43(7), 1471 - 1472; DOI [10.1021/jo00401a044](https://doi.org/10.1021/jo00401a044)
- W.G. Dauben & H.O. Krabbenhoft, “Organic Reactions at High Pressure. Cycloadditions with Furans,” *J. Am. Chem. Soc.* **1976**, 98(7), 1992 - 1993; DOI [10.1021/ja00423a071](https://doi.org/10.1021/ja00423a071)