**The Diels-Alder Reaction: Identification of an Unknown Dienophiles**

**Data Presentation**

* Dienophile B= 1.5060g
* Mass of Product= 2.26g
* % Yield= 96.17%
* Melting Point= 168.3 C

**Conclusion**

In conclusion, the Melting Point and the NMR data refer to the product being 5-Norbornene-2-endo-3-exo-dicarboxylic acid. However, at first I was looking at the melting point individually till I realized that only the melting point wouldn’t give the answer as they both would have the same melting point and same molecular compositions (thus same IR). Thus, an NMR data was very helpful in figuring out Dineophile B, Fumaric Acid.   
  
  
  
  
  
The NMR data shows a huge steep peak around 6.2. These peaks are considered to be the vinylic hydrogens (protons). Also, there is a doublet between 6.0-6.5 signifying that the carboxylic acids are in the different chemical environment or not chemically equivalent. Also, it suggest that the carboxylic acids have different stereochemistry, thus ruling out the first reaction of Maleic Acid since both of the products are either endo or exo; and the product of reaction with fumaric acid has different stereochemistry (neither exo nor endo). Since there would be only one product formed, that product would be the most stable and the major product. There happens to be another peak at 2.07, which is supposed to be disregarded due to the fact that acetone was used during the NMR analysis procedure.   
The Dienophile happens to be very polar, thus when a TLC plate test was conducted on the third try there wasn’t a marking down on the position of the unknown dienophile TLC standard on the reaction mixture. Signifying that the reaction went to completion when run with 20:80:1 (hexane:ethyl acetate: acetic acid). Although, the product happened to be very high on the TLC plate signifying that the product is very non polar.

The product needed to be cooled down till room temperature and then placed in the ice bath. While the product was cooling down to room temperature it was observed that the crystals already started forming prior to the ice bath. It was extremely important that it was cooled down to room temperature independently due to the fact if it was rapidly cooled from boiling temperature it would have a solid crystals and it might’ve been impossible to get it out of the flask to perform a vacuum filtration.