## Diels-Alder Reaction in Water

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## Aims

The experiment aims to carry out the Diels Alder reaction in water.

## Introduction

## Experimental Method

9-anthracenemethanol (0.1g, 4.80x10-4moles) was added to a 100mL round bottom flask. 60mL deionised water and a stirrer bar were added. *N*-methylmaleimide (0.16g, 0.00144moles) was added to the flask and the contents were stirred. A reflux condenser was fitted to the flask and the flask was heated to reflux with continued stirring. The flask was periodically agitated to ensure no material stuck to the sides of the flask.

The progress of the reaction was monitored by comparing TLCs of the reaction vessels contents using 9-anthracenemethanol as a reference standard. A 1:1 ratio of ethyl acetate-hexane was used as an eluent. Two TLCs were taken, one after half an hour had passed from the beginning of reflux and one an hour after the beginning of reflux. The Results of the second reflux implied the reaction was complete.

The mixture was cooled to room temperature and then cooled in an ice bath. A small amount white precipitate product was observed in the reaction flask. The product was collected via vacuum filtration in a Hirsch funnel and dried using the funnel. The yield and melting point were recorded.

## Results

The recorded yield was 0.09g.The percentage yield of product was calculated to be 58.77%. The melting range of the product was observed to be 237-239oC.

## Discussion and Conclusions

The reaction was successfully carried out and the melting point test implied that the attained product was indeed the desired product.

## Post Practical Questions

1. A mechanism is included with the report.
2. In this reaction 9-anthracenemethanol acts as the diene and *N*-methylmaleimide acts as the dienophile.
3. The diene in this reaction is less reactive because the carbon atoms are more conjugated and are hence more stable.
4. The rate of the Diels-Alder reaction id greatly accelerated in an aqueous medium due to the hydrogen bond donating capacity of H2­O and due to the high solvophobicity (specifically hydrophobicity) of the reactants. The rate of the reaction is increased due to enforced hydrophobic reactions occurring. The reactivity of the reactants is increased due the hydrogen bonding interactions in water.