Introduction

Reactions of radicals in water is one of the crucial steps in all the biological systems. Different types of interactions of the radicals with water and the subsequent species formed have been of great interest to the scientific community. The interactions and the species formed are extremely short-lived which makes it difficult to detect them spectroscopically. Hence the formation of these species is done at extremely low temperatures of 3 K - 10 K.

The diphenylmethyl radical was successfully isolated in good yields in ice matrix at 3 K. Subsequent irradiation with UV light leads to the generation of the benzhydryl cation which is stable enough to be detected spectroscopically. Further irradiation of the cation regenerates the precursor (1,1,2,2-tetraphenylethane) itself. Further studies of this radical and its interaction with water is still in progress.

Here the interactions formed by the radical and the cation in 100% water matrix, are thoroughly studied to know the form of interaction and the mechanistic pathway undertaken. We also performed Density Function Theory (DFT) calculations to confirm the formation of the diphenylmethyl radical and the benzhydryl cation.

Results and Discussion.

Matrix Isolation of Diphenylmethyl radical in Argon matrix and Photochemistry

**Benzhydryl cation!!!**

Ice matrix!

Photochemistry of Diphenylmethyl radical in 100% water matrix

Progressive formation of the benzhydryl cation at 443 nm on irradiation of the diphenylmethyl radical in water matrix at 8 K.

CONCLUSION

The diphenylmethyl radical was successfully generated from 1,1,2,2-tetraphenylethane in Ar matrix at 3K. We also successfully generated the benzhydryl cation from the radical using 308 nm Laser. Further irradiation leads back to the formation of the precursor itself. Here we also studied the reversibility between the radical and the cation species using Infrared (IR) and UV-Vis spectroscopy.

The interconversion between the radical and the cation in 100% water matrix on exposing them to lights of different wavelengths at 3 K.

References.


Acknowledgements:

European Symposium on Organic Reactivity 1. This work is supported by the Cluster of Excellence RESOLV (EXC 1069) funded by the Deutsche Forschungsgemeinschaft
2. GDCh and Liebig Association for Organic Chemistry for the travel grant
3. Professor. Dr. Sander and my lab colleagues