

2.175 A new reaction pathway other than the Criegee mechanism for the ozonolysis of a cyclic unsaturated ether.

Early Career Scientist

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Abstract:

Biofuels are considered to be an environmental friendly alternative to fossil fuels. Furanic compounds have been considered as second generation biofuels as they can be produced from non-food biomass. However, the atmospheric behavior of such compounds is required to evaluate their potential to be used as biofuels. The matrix isolation technique combined with infrared spectroscopy has been used to study the ozonolysis mechanism of 2,5-dihydrofuran. A new reaction pathway that is different from the widely accepted Criegee mechanism has been found. Experimental and theoretical results show the evidence of the formation of a furan-H₂O₃ complex through a dehydrogenation process. The complex is trapped in the argon matrix and stabilized through hydrogen bonding interaction. Meanwhile, the conventional ozonolysis intermediates were also observed, including the primary ozonide, the Criegee intermediate and the secondary ozonide. The present study highlights the cases in which the Criegee mechanism is not the dominant pathway for the reactions of cyclic alkenes with ozone. The cyclic alkenes that can form an aromatic conjugated system by the dehydrogenation process may follow the new mechanism when react with ozone in the atmosphere.