

Comprehensive summary of the sanctioned research proposal to  
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Title: Establishment of Pulsed Laser Photolysis – Laser Induced Fluorescence (PLF-LIF) Spectrometer and measurement of atmospheric lifetimes of volatile organic compounds in the Earth's atmosphere

Abstract

Any compound that is released into the atmosphere will undergo several processes, both physical and chemical in nature before it is degraded in the atmosphere. The most important chemical process via which the compound is lost in the Earth's atmosphere is by reacting with the most abundant OH radicals during daytime. Another very important process of decomposition is via photo degradation. The photochemistry plays a very important role in determining the fate of the molecule and the product formed in the process. Therefore it is very important and necessary to investigate both the kinetic parameters of the reactions of OH and other radicals with the compounds of interest in the Earth's atmosphere and the photochemical parameters like quantum yields and absorption cross sections in the UV-Visible region of the atmospheric window.

The present proposal is focused on establishing the Pulsed Laser Photolysis – Laser Induced Fluorescence (PLP-LIF) facility to investigate the mechanistic studies and to measure the kinetic parameters of the OH and NO<sub>3</sub> radicals with very important compounds of current interest in the Earth's atmosphere. The atmospheric life times of the compounds under investigation will be computed using the experimentally measured kinetic parameters.

Objectives

1. To establish the PLP – LIF spectrometer
2. To measure the rate coefficients for the OH and NO<sub>3</sub> radical reactions with atmospherically important chemical compounds
3. To compute the tropospheric lifetimes using the experimentally measured rate coefficients
4. To calculate the global warming potentials of the atmospherically important compounds