The Importance of Atmospheric Chemistry and Radical Reactions

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ABSTRACT

The atmosphere contains various reactive gases whose concentrations are controlled by complex chemical processes. Among them, the OH and HO_2 radicals play essential roles in atmospheric oxidation, influencing the lifetimes of greenhouse gases such as CH_4 and CO, as well as pollutants including NOx and ozone. However, the atmospheric concentrations of OH and HO_2 are extremely low, requiring highly sensitive spectroscopic techniques for detection. This study focuses on developing a Cavity Ring-Down Spectroscopy (CRDS) system to enhance the effective optical path length and improve detection limits. The system will be applied to measure the near-infrared absorption spectrum of HO_2, addressing the limited availability of high-quality spectral data. The results will contribute to a better understanding of radical kinetics and their roles in atmospheric chemistry.