

研究论文

大气条件下O<sub>3</sub>与乙炔反应速率常数的测定

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摘要 O<sub>3</sub>是对流层大气中一种重要的氧化剂, 其与反应活性气体的反应是大气对流层中重要的反应过程,

对于研究空气污染的对策有重要意义. 我们使用自行建设的烟雾箱模拟反应装置, 结合O<sub>3</sub>

分析仪和气相色谱研究了O<sub>3</sub>和乙炔的反应. 研究测得O<sub>3</sub>和乙炔在室温下(15 °C)反应的4

次实验的速率常数的平均值为 $4.13 \times 10^{-21} \text{ cm}^3 \cdot \text{molecule}^{-1} \cdot \text{s}^{-1}$ , 其变动系数为7%.

与文献中采用其它方法得到的实验值相吻合. 所得结果表明, 我们测定的反应速率常数有较高的精密性,

我们所建的大气反应烟雾箱模拟系统是可靠的, 可以用于大气O<sub>3</sub>浓度条件下O<sub>3</sub>

的其它大气化学反应过程的深入研究,

为进一步深入研究大气中其它重要反应活性气体的化学反应提供了一定的基础.

关键词 [臭氧](#) [乙炔](#) [动力学](#) [反应速率常数](#)

分类号

**Determination of Rate Constants for Ozone Reactions with Acetylene under Atmospheric Conditions**

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**Abstract** Ozone is an important oxidant in the troposphere, and its reactions with reactive gases are important processes in the troposphere, which has a significance for the research on countermeasures of air pollution. The simulative reaction equipment of smog chamber, made in our laboratory, was used to study ozone reactions with acetylene in terms of monitoring instruments of ozone analyzer and gas chromatography. A mean value of  $4.13 \times 10^{-21} \text{ cm}^3 \cdot \text{molecule}^{-1} \cdot \text{s}^{-1}$  for rate constant was obtained from four experiments under room temperature of about 15 °C. Its variant coefficient is 7%. Our rate constant is within the range reported by other researchers using different experimental conditions and detecting methods. Results show that the precision of determination of rate constants is high from our experiments. Our self-made simulation system of smog chamber for atmospheric reactions is reliable, which can be applied to deep research of other ozone reactions under atmospheric ozone concentrations. Our results and experimental system provide a good basis for further research on chemical reactions of other important reactive gases in the atmosphere.

**Key words** [ozone](#) [acetylene](#) [kinetics](#) [rate constant](#)

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