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论文

六氟乙烷的热分解特性

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摘要:

采用管式炉研究了950~1100 ℃温度区间C_2F_6的分解特性, 并研究了C_2F_6的初始浓度、反应温度、停留时间对C_2F_6分解率的影响. 实验结果表明, C_2F_6初始浓度越低、温度越高、反应时间越长, C_2F_6分解率就越高. 同时, 热解反应的反应级数应该介于0和1之间. 在温度为1100 ℃, C_2F_6初始浓度为223.21 μmol/L, 停留时间为2 s时, C_2F_6分解率高达90%. 根据Arrhenius方程计算, 在950~1100 ℃, C_2F_6热分解反应的活化能(E_a)为313.2 kJ/mol, 频率因子(A)为8.8×1011 s^{-1}.

关键词: 六氟乙烷 特性 热分解

Characteristics of Perfluoroethane Thermal Decomposition

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Abstract:

Perfluorocarbons(PFCs) gases have high global warming potential(GWP) and a long lifetime in the atmosphere. It is difficult to decompose these gases due to their tetrahedral structure arising from strong C—F bonds. This paper discussed C_2F_6(one of PFCs gases) thermal decomposition characteristic under 950—1100 ℃ in a laboratory scale reactor. The effects of C_2F_6 initial concentration, reaction temperature, residence time on C_2F_6 decomposition ratio were also investigated. The experimental results indicate that the lower initial C_2F_6 concentration, higher reaction temperature, longer residence time can promote C_2F_6 decomposition ratio. On the basis of the results, it can be drawn that the reaction order of C_2F_6 thermal decomposition is between 0 and 1. Above 90% C_2F_6 decomposition ratio can be achieved under a temperature of 1100 ℃, 223.21 μmol/L initial C_2F_6 concentration and 2 s residence time. Basis on the calculation, the activation energy(E_a) and the frequency factor(A) of C_2F_6 thermal decomposition in the temperature range of 950—1100 ℃ were 313.2 kJ/mol and 8.8×1011 s^{-1}, respectively.

Keywords: C_2F_6 Characteristic Thermal decomposition

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