

工程热物理

SO₂对燃料型NO生成的影响机理

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摘要: 为了揭示燃煤过程中SO₂和NO_x的相互影响机理, 采用Chemkin程序, 综合考虑碳氢化合物燃烧、氮氧化物生成和硫氮反应3方面因素, 探讨挥发分燃烧过程中SO₂气体对燃料型NO生成的影响机理。计算结果表明, HCN氧化生成燃料型NO的反应在毫秒级时间内完成, 占控制地位的基元反应都涉及到自由基, 自由基的浓度决定反应的速率和进行程度。富氧情况下SO₂对燃料型NO的生成影响非常微弱。在贫氧条件下, 增大SO₂浓度, 燃料NO的生成速率和生成量下降, 原因可以归结为SO₂通过中间产物HSO₂和SO₃, 催化整合了自由基, 降低了自由基浓度。因此, 贫氧工况下SO₂对燃料NO的生成具有强烈抑制作用。

关键词: 氮-硫反应 燃料型NO 基元反应 动力学模拟

Effect Mechanism of SO₂ on Fuel-NO's Formation

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Abstract: Aim to uncover interaction mechanism between SO₂ and NO_x during coal combustion, the program Chemkin was used to investigate effect mechanism of SO₂ on formation of fuel-NO during combustion of volatile, considering three factors such as hydrocarbon's combustion, formation of NO_x and interaction between SO₂ and NO_x. The results indicated that reaction of HCN oxidation to NO finished in milliseconds, and radicals were important reactants or resultants of main elemental reactions during oxidation of HCN. Concentration of radicals had important effect on rate and extent of reaction. Effect of SO₂ on formation of fuel-NO was faintness under rich oxygen condition. As for poor oxygen condition, Production rate and output of fuel-NO decreased with concentration of SO₂ increasing. Concentration of radicals decreased for radicals were catalyzed to molecules by SO₂, and intermediate were HSO₂ and SO₃. Therefore, SO₂ can restrain the formation of fule-NO effectively under poor oxygen condition.

Keywords: nitrogen-sulfur interaction fuel-NO elemental reaction kinetic simulation

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