

王东,孙保民,肖海平,汪涛,朱翔宇,韩高岩.介质阻挡放电中添加乙炔对NO脱除的影响[J].环境科学学报,2014,34(2):331-335

介质阻挡放电中添加乙炔对NO脱除的影响

Effect of acetylene on NO removal in dielectric barrier discharge reactor

关键词: [介质阻挡放电](#) [乙炔](#) [水](#) [脱除率](#) [自由基](#)

基金项目: [国家自然科学基金 \(No.51206047\)](#)

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摘要: 利用介质阻挡放电 (DBD) 进行模拟烟气脱除NO实验, 通过改变乙炔体积分数和烟气水蒸气含量研究添加乙炔对NO脱除效率的影响. 结果表明: 烟气中添加乙炔强化了NO氧化作用, 随着乙炔体积分数的提高, NO脱除率逐渐增加. 在NO/N₂/O₂/C₂H₂/H₂O体系中, 水的电负性和离解反应消耗大量高能电子, 降低了活性自由基的生成, NO脱除速率随之减慢; 能量密度低于400 J · L⁻¹时, 相对湿度 (RH) 为0的情况下脱出效果最好. 但随着能量密度的增加, H₂O不会影响最终的NO脱除率; H₂O的添加可以产生更多的 · OH自由基, 促进NO₂向HNO₃转化, 使出口NO₂浓度大幅度降低.

Abstract: The experiment of NO removal was carried out to study the influence of acetylene concentration and relative humidity on the removal. A cylinder dielectric barrier discharge reactor was used to produce plasma. Results indicated that the oxidation of NO was strengthened in the presence of acetylene, and the removal efficiency of NO increased as more C₂H₂ was added. The water vapor in the simulated gas suppressed the corona and reduced the discharge power. Consequently, the removal efficiency of NO decreased in the presence of H₂O due to the fact that a larger number of electrons were consumed. The NO removal efficiency was the highest without the addition of H₂O in the energy density range of 0~400 J · L⁻¹. However, the effect of H₂O will be weakened with an increasing energy density; the removal efficiency of NO can reach the same value of 65%. Meanwhile, the OH radicals generated by dissociation of H₂O promoted the conversion from NO₂ to HNO₃, and the outlet concentration of NO₂ decreased sharply.

Key words: [dielectric barrier discharge](#) [acetylene](#) [H₂O](#) [removal efficiency](#) [radicals](#)

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