

· 解析评价 ·

春节燃放烟花爆竹对南京气溶胶细粒子的影响

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摘要:根据南京城区草场门与远郊固城湖大气观测点 PM_{2.5} 质量浓度及组分监测结果, 分析了 2012 年春节期间烟花爆竹燃放对城市气溶胶细粒子的影响。结果表明, 春节除夕和初五烟花爆竹集中燃放时段, 草场门观测点 PM₁₀ 和 PM_{2.5} 均出现同步异常突升, 且细颗粒物占比较大, PM_{2.5} 最大峰值同比远郊固城湖观测点分别高出 2.79 倍和 6.02 倍; PM_{2.5} 各化学组分中, 城区草场门观测点水溶性离子 K⁺、Cl⁻ 和 SO₄²⁺ 以及微量元素 K、Al、Mg、Fe、Ba 等值同比远郊固城湖明显偏高, 春节烟花爆竹燃放对南京城区空气质量影响显著。

关键词:燃放烟花爆竹; 细颗粒物; 化学组分; 南京

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Effect of Firecracker Setting-off on the Fine Particle Pollution in Nanjing during the Spring Festival

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Abstract: The study analysed the effect of firecracker setting-off on the fine particle pollution in city during the Spring Festival, based on the data of the mass concentration and the component of PM_{2.5} on Caochangmen (CCM) monitoring station in urban Nanjing and Guchenghu (GCH) monitoring station in suburb Nanjing. The results indicated that, during the firecracker setting-off on the New Year's Eve and the 5th of Jan. In the lunar calendar period, the mass concentration of PM_{2.5} rose abnormally on CCM station, and its actually hourly maximum concentration were 2.79 and 6.02 times higher than the concentration on GCH station. The concentration of water-soluble ions (K⁺, Cl⁻, SO₄²⁺) and the elements (K, Al, Mg, Fe, Ba) of PM_{2.5} on CCM station were higher than the concentration on GCH station. As a result, the firecracker setting-off can dramatically affect the air quality in urban Nanjing during the Spring Festival.

Key words: Firecracker setting-off; Fine particle; Chemical compositions; Nanjing

关于烟花爆竹燃放对空气质量的影响, 国内外开展了一些相关的研究。文献[1-2]对北京、西安春节期间大气污染特征分析发现, 烟花爆竹燃放对近地面污染物质量浓度的短时贡献可大大超出现有污染源的贡献, 尤其是燃放导致的细颗粒排放远远高于粗颗粒, 使得空气中 PM₁₀、PM_{2.5}、SO₂ 和 NO₂ 等质量浓度的上升, 造成严重的大气污染。文献[3-5]对颗粒物离子组分研究表明, 春节烟花爆竹燃放时段, PM_{2.5} 中的水溶性离子 Cl⁻、K⁺ 和

SO₄²⁻ 等浓度会急速上升, 且 K⁺、Cl⁻ 与 Mg²⁺ 表现出较高的相关性, 并佐证了这些现象的发生与烟花爆竹中氧化剂、还原剂等组分的燃烧释放有关。文献[6-8]对颗粒物中微量元素分析研究均发现燃

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