

· 前沿评述 ·

典型污染时段鹤山大气 VOCs 的臭氧生成潜势及来源解析

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摘要:2013年10月对广东鹤山大气中挥发性有机化合物(VOCs)变化特征、臭氧生成潜势和来源进行了研究。结果表明,观测期间测得的VOCs总平均值为 26.6×10^{-9} ,表现为烷烃>苯系物>烯烃;烯烃日间值变化幅度较大,在清晨达到最大值;苯系物与一次污染物CO的变化趋势十分接近;烷烃的峰值出现时间较苯系物有所提前,且在短时间内迅速升高,表明观测点周边可能存在排放源;大气中各类VOCs的臭氧生成潜势(OFP)贡献表现为苯系物>烯烃>烷烃;从物种来看,乙烯等10种物质对总OFP的贡献占到了80.4%;观测期间测得的OFP贡献较大的VOCs物种主要来源于石化源、油漆溶剂和汽油挥发源。

关键词:挥发性有机化合物;臭氧生成潜势;来源解析;鹤山

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Potential Ozone Formation and Emission Sources of Atmospheric VOCs in Heshan during Typical Pollution Episode

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Abstract: Atmospheric VOCs was measured at Heshan in October 2013. The variation pattern, ozone formation potential and emission sources were analyzed. Average concentration of total VOCs observed was 26.6×10^{-9} , while alkane > BTEX > alkene. Concentration of alkene peaked at early morning with large variations during the daytime; variation patterns of BTEX and CO were quite similar; concentration of alkane peaked earlier than BTEX and rised rapidly in a very short time, which indicated the influence of nearby emission sources. Ozone formation potential calculation by the speciated VOCs appeared as BTEX > alkene > alkane. 10 key VOCs species including ethylene contributed 80.5% of total OFP; VOCs contributed most of OFP were mainly came from petrochemistry, paint solvents and gasoline vapor during observation.

Key words: VOCs; Ozone formation potential; Source apportionment; Heshan

大气挥发性有机化合物(VOCs)除其本身包括了许多有毒有害物种外,可作为前体物与NO_x反应生成臭氧,导致大气光化学烟雾发生,对动植物产生健康损害^[1]。近30年来,由于社会经济持续发展,污染防治水平较低,主要大气污染物排放总量巨大且集中,全国整体大气污染形势严峻,以京津冀、长三角、珠三角为代表的经济快速发展地区出现不同程度区域性大气复合污染,以臭氧为特征的区域性光化学烟雾污染时有发生,以大气细

粒子(PM_{2.5})污染为特征的灰霾天气频发^[2-3]。

由于珠三角的臭氧高值通常出现在太阳辐射强且干燥少雨的秋季^[4],在广东鹤山地区秋季臭氧出现高浓度期间,同步测量了该地区的VOCs组成和浓度,计算各种VOCs的臭氧生成潜势

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