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论文

南京市大气降尘重金属含量特征及来源研究

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摘要：

文中对南京市大气降尘重金属含量水平进行了研究,从2006年12月起连续收集一年的大气降尘样品,分析了As、Cd、Cr、Cu、Hg、Mn、Mo、Ni、Pb、Se、Zn等11个元素。结果表明,与土壤背景值相比,南京市大气降尘中除Cr、Fe、Mn外的重金属含量总体明显升高。采用相关分析和主成分分析,对降尘重金属元素来源进行解析,认为有三种主要来源:一是As、Cu、Hg、Pb、Se与燃煤活动、汽车尾气排放有关。二是Cd、Ni、Zn、Mo可能与化学工业有关,但Mo还受工业活动、土壤颗粒物的影响。分析还表明,在化工业园附近的样点,这些元素含量普遍较高。三是Mn、Cr主要与土壤颗粒物有关(自然来源)。以Fe作为参考元素计算重金属的富集因子表明,自然来源的Cr、Mn具有较小的富集因子,而受工业活动影响的Cd、Pb、Se、Zn具有较大的富集因子。

关键词： 重金属;富集因子;主因子分析;南京

Concentrations and sources of heavy metal in atmospheric dustfall in the Nanjing city, East China.

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Abstract:

 Seventeen atmospheric dustfall samples were collected successively from December 2006 to December 2007 in Nanjing, China. All dustfall samples were analyzed for concentrations of As, Cd, Cr, Cu, Hg, Mn, Mo, Ni, Pb, Se and Zn. The results indicated that, compared with the background values of soil in Nanjing area, atmospheric dustfalls have elevated metal concentrations as a whole, except those of Cr, Fe and Mn. Correlation coefficient analysis and principal component analysis (PCA) were performed and three main sources were identified: (1)As, Cu, Pb, Hg and Se are mainly derived from coal combustion and traffic exhaust; (2)Cd, Ni, Mo and Zn are possibly related to petrochemicals, and Mo is also originated from industrial sources and soil particles (natural source). The samples near to the petrochemical park have relatively high concentrations in these elements, which further confirms the source identification; (3)Cr and Mn are mainly derived from soil particles. Based on concentration analysis and correlation analysis, Fe was selected as the reference element to calculate the heavy metal enrichment factors (EFs), which in turn further validates the source identification. Naturally derived Cr and Mn show the lowest enrichment relative to the background values. Nevertheless, anthropogenically enhanced Cd, Pb, Se and Zn show maximum enrichments. Therefore, EFs give an insight of the level of human influence on atmospheric dustfalls.

Keywords:

Key words: heavy metals; enrichment factors; principal component analysis; Nanjing

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