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研究报告

中国北方大气中有机卤素污染物的污染水平

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摘要 应用仪器中子活化分析(INAA)及气相色谱质谱联用技术(GC/MS)研究了PUF大气被动采样器采自全国31个点的大气样品中的可萃取有机氯/溴/碘(EOCl/Br/I)和多氯联苯(PCBs)。结果表明，大气中卤素污染物质量浓度最高的点大部分分布在城区，且呈现沿城市到乡村的下降趋势；在交通枢纽地区大气中EOCl的质量浓度要高于远离交通枢纽的采样点，机动车尾气的排放是大气中有机氯污染物的重要来源之一；工业也是大气中有机氯污染物的主要来源。84种PCBs异构体分析结果表明，大气中PCBs主要以低氯代PCBs为主，Cl_2-CB占总PCBs的41%，Cl_3-CB含量最高，占总量的43%，其余异构体含量随取代氯原子的增加而下降，这种异构体的分布特征与我国所生产和使用的PCBs“指纹谱”非常相近，且PCBs异构体的分布特征没有地域差异，这表明大气环境中PCBs主要来自工业污染，且城市地区是我国大气中PCBs的主要来源。在所有已测定的样品中已知PCBs的氯在总EOCl中的比例不足1.0%，大气中绝大部分的有机氯为未知化合物。

关键词 中子活化分析(NAA) 可萃取有机卤素污染物(EOX) 多氯联苯(PCBs) 大气 被动采样器

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Levels of Organic Halogen Compounds in the Atmosphere in Northern China

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Abstract Organic halogens have long been recognized to be severe environmental pollutants, because of their persistence, bioaccumulation and potential hazardous impact on human health. In this study, a large- scale network of 31 passive air sampling sites was used to better understand th

e atmospheric distributions of organic halogens across China. EOCl, EOBr, EOI, and PCBs in th e atmospheric samples were determined by a hybrid NAA method combined with GC-MS. EO Cl, EOBr, EOI, and PCBs exhibited a huge urban rural gradient. The highest va lues we re detected in the areas of high usage and emission, which were linked to the local urbanization wi th relatively rapid economic development in China. The results clearly indicate that these pollutant s mainly come from industrial pollution. Higher EOCl contents in traffic areas state that exha ust emission from vehicle is another main source of organochlorines in air. The relative proportion s of the known organochlorines (84 PCB congeners) to total EOCl are less than 1.0%, which imp lies that most of EOCl measured in air are unknown. PCBs are dominated by di-CB (mean: 4 1%) and tri- CB (mean: 43%). No systematic distribution differences of PCB congeners in th e sampling locations are found, which suggest that atmospheric contamination of PCBs in China a re still controlled by primary sources, rather than secondary ones.

Key words neutron activation analysis (NAA) _ extractable organ halogenated p ollutants (EOX) _ polychlorinated biphenyls (PCBs) _ air _ passive air samplers

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