

Temporal-spatial distribution of lead and its bioaccessibility in urban surface dust of Hangzhou, China

FEI-LI LI, ZAN-FANG JIN, WEN SHI,
XINYANG XU

College of Environment, Zhejiang University of
Technology, Hangzhou 310032, China

Introduction

To investigate pollution status of Pb in surface dust of Hangzhou, a total of 78 urban surface dust samples were collected every two months (October 2012 to August 2013) including three functional areas (residential, recreational, and traffic area) and the botanical garden as a background.

Results and Discussions

The main physicochemical properties and Pb contents of urban dusts were measured; an *in vitro* test of PBET (Physiologically Based Extraction Test) was used to assess bioaccessibility in gastric and small intestine phase of Pb.

Pb content in residential, recreational, and traffic dusts were 1165, 125, and 100 mg/kg, respectively, with 2.6-213 times the background values. The highest values of Pb in residential and recreation areas appeared in December 2012, while the lowest values appeared in August 2013.

The PBET analysis showed that bioaccessibility of Pb in gastric phase and small intestine phase were in range of 7.01-70.91%, and 0.29-19.31%, respectively, higher than those of urban dusts of Guangzhou^[1]. The highest average Pb bioaccessibility of 40.62±19.68% was appeared in the recreation area, followed with traffic and residential areas.

The bioaccessibility of Pb was positively correlated with total Fe, Mn ($P < 0.01$), and silt content (2-50 μm) ($P < 0.01$), but negative correlated with sand content (>50 μm) ($P < 0.01$).

The hazard quotients (*HQ*) of bioaccessible Pb of three area dust were less than 1 except that of the total content Pb exposure of residential areas dust for 3-year-old children.

The plots of residential dust in the biplot of $^{208}\text{Pb}/^{206}\text{Pb}$ vs $^{207}\text{Pb}/^{206}\text{Pb}$ ratios formed a straight line, while the points of deep soils and coals stood far on the left side, indicating that paint and mobile exhaust might be the main sources of residential dust^[2].

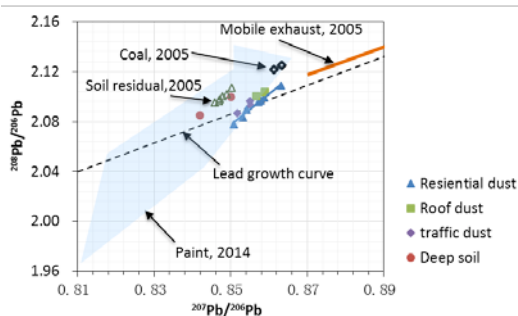


Figure 1. Biplot of $^{208}\text{Pb}/^{206}\text{Pb}$ vs $^{207}\text{Pb}/^{206}\text{Pb}$ ratios of urban surface dust samples in Hangzhou.

References