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Pb ISOTOPIC COMPOSITION OF THE ATMOSPHERE OF THE SÃO PAULO CITY, BRAZIL, AND ISOTOPIC CHARACTERIZATION OF SOME POLLUTANT SOURCES

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Lead isotopic compositions of the atmosphere of São Paulo city and the isotopic signatures of the possible pollutant sources, for the period of August/1999 to September/2000, were determined from particulate matter (PM_{10}) collected on clean teflon filters, and rainwater samples at the São Paulo University. The PM_{10} $^{207}Pb/^{206}Pb$ ratios range from 0.786 to 0.875, and $^{208}Pb/^{206}Pb$ from 1.934 to 2.119, defining an array on the Pb diagram. Pb concentrations range from 3.02 to 254.52 ng/m^3, averaging about 15 times lower than the limit of 1.5 µg/m^3 established by the Environmental Protection Agency, USA. Rainwater samples displayed the same isotopic ratios measured on PM_{10} collected on the same day, thus indicating that aerosols are scavenged by rain.

Analyses of possible pollutants such as gasoline and ethanol ($^{207}Pb/^{206}Pb$ = 0.839-0.873), soot from vehicle exhaust pipes ($^{207}Pb/^{206}Pb$ = 0.858-0.890), and particulate material from industrial emissions collected on fiberglass filters ($^{207}Pb/^{206}Pb$ = 0.781-0.861) mostly yielded isotopic compositions falling into an interval defined by 84% of the PM_{10} samples ($^{207}Pb/^{206}Pb$ = 0.840-0.870). However, 15% of the PM_{10} samples are more radiogenic, indicating a significant, unidentified radiogenic source ($^{207}Pb/^{206}Pb$<0.780), evident mainly in samples collected during weekends and from November/1999 to April/2000. One industrial emission sample showed a $^{207}Pb/^{206}Pb$ ratio of ca. 0.79, but a blank filter also presented a similar value, thus impeding confirmation of this industrial emission as the radiogenic source.

We suggest that most of the anthropogenic Pb found in the São Paulo atmosphere comes from industrial emissions, since Pb concentration in vehicular fuels is very low (less than 38 µg/L). Regional background geogenic lead yielded non-radiogenic values ($^{207}Pb/^{206}Pb$ = 0.909-0.932) confirming that this Pb is insignificant in the atmospheric lead budget of São Paulo.