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$PM_{2.5}$ and metals determination in $PM_{2.5}$ collected in São Paulo during the Covid-19 Pandemic

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Palavras Chave: *Particulate Matter; Covid-19; Pandemic; Air Pollution*

Highlights

Fifty $PM_{2.5}$ samples were collected during quarantine in São Paulo (March to August 2020). Trace elements determination was performed by ICP-MS and enrichment factors were calculated.

Resumo/Abstract

In 2020, the covid-19 pandemic challenged global health systems. To contain the advance of virus transmission, social isolation with different levels of restriction were adopted in several countries, including Brazil, promoting a reduction in the anthropogenic activity. The vehicular traffic reduction and activities of some industries led to a decrease in atmospheric pollution. To assess the effects of social restriction measures on air quality, fifty $PM_{2.5}$ samples were collected (from March to August, 2020) in São Paulo at a site in the University of São Paulo campus (urban area), using a high volume sampler and quartz fiber filters. Trace elements in $PM_{2.5}$ were determined by ICP-MS after microwave acid extraction.[1]

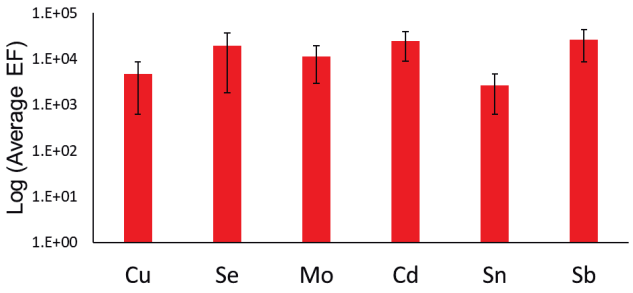

Figure 1. Enrichment factors for trace elements in $PM_{2.5}$

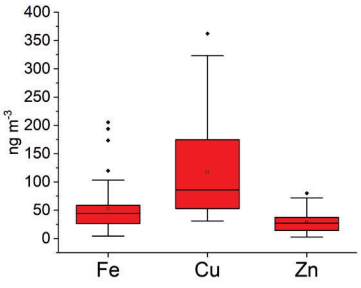

Figure 2. Major elements in $PM_{2.5}$

Enrichment factors (EFs) were calculated and Fe was considered as a reference element due to its greater abundance in the crust. Fig.1 presents the elements with higher EFs. Cu, Zn, As, Se, Rb, Mo, Cd, Sn, Sb and Pb presented EFs>10, indicating influence of anthropogenic emissions, such as industries, non-exhaust emissions (e.g. brake and tire wear) and fuel combustion.[1,2] V, Ti, Cr, Mn, Ni, Ba and Sr showed EFs<10, indicated that soil dust resuspension was the main source.[2] Cu (95 ng m^{-3}), Fe (45 ng m^{-3}) and Zn (27 ng m^{-3}) presented higher concentrations in $PM_{2.5}$ (Fig. 2). Mo, Sn and Sb are mainly related with brake wear emissions.[2,3,4] Cu is associated with brake wear and, ethanol use and gasohol emissions (engine corrosion)[2], and Cd and Se are associated with combustion sources.[4] These results indicate that during the period of social restriction, anthropogenic emissions from industrial activities and vehicular traffic contributed to metal enrichment in $PM_{2.5}$, despite of the lower concentrations than previous studies.[2] $PM_{2.5}$ concentrations ranged from 5 to 35 μg m^{-3}, median concentration was over 17 ng m^{-3}.

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