Organic and inorganic characterization of particulate matter collected in the vicinities of a petrochemical complex in São Paulo, Brazil.

S.E.S Caumo[1], A. Vicente[2], D. Custódio[2], C. Alves[2], P. C. Vasconcellos[1]

[1]Institute of Chemistry, University of São Paulo, São Paulo, Av. Lineu Prestes, 745, cep 05508-000, Brazil
[2]Centre for Environmental and Marine Studies, Department of environment, University of Aveiro, Aveiro, 3810-193, Portugal
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Presenting author email: perola@iq.usp.br

São Paulo (SPA) is the largest city in South America and presents a strong economic importance for the country. In the last years, SPA has revealed large problems concerning air pollution (Vasconcellos et al., 2011). The responsibility for the emissions of organic and inorganic to the atmosphere has been attributed to local sources. Other sources have also contributed to the deterioration of the air quality, such as fossil fuels burning and sugarcane burning. Besides these sources, petrochemical refineries can also deteriorate air quality. The biggest one, located at São Paulo Metropolitan Area (SPMA), is responsible for 30% of the fuel produced. Oil refineries are associated with organic and inorganic compounds emissions to the atmosphere, mainly coming from gasoline production and fuels storage (Cetin et al., 2003).

Carbonaceous species constitute a very significant fraction of the atmospheric aerosol, accounting for between 10 and 50% of the total particulate matter (Schwarz et al., 2008). Organic carbon (OC) can be emitted by primary and secondary sources, while elemental carbon (EC) is emitted exclusively emitted by combustion processes.

Hopanes are pentacyclic triterpanes normally containing 27 to 35 carbon atoms in a naphthenic structure. They are associated with emissions from crude petroleum and source rocks, engine lubricating oil, and other sources.

These compounds are not present in gasoline and diesel fuel because they belong to the higher boiling fraction of crude petroleum, but they are found in lubricating oil. Therefore they have been proposed as molecular markers to identify the sources of oil pollution.

The objective of this study was to determine the organic and inorganic species present in the particulate matter collected in the vicinities of a petrochemical complex located close to São Paulo city. The samples were collected with a high volume sampler and quartz fiber filters. In total, fifteen samples were collected between October and November 2015. EC and OC concentration were determined by thermal-optical method (Pio et al., 2011).

For the organic analysis, samples were extracted with dichloromethane and submitted to a column fractionation. The hopanes were obtained using *n*-hexane as solvent and were determined by GC-MS. The inorganic compounds were extracted with ultrapure water and the extracts were analyzed by ion chromatograph.

Figure 1 shows the variation in the concentration of EC, OC and total carbon (TC) for all the samples.

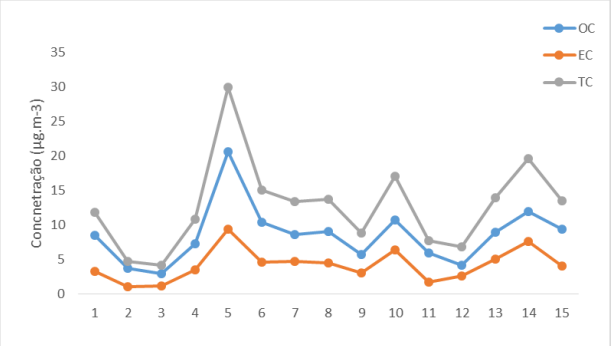

Fig. 1 – EC, OC and TC concentration (µg m^{-3}) for the samples collected at petrochemical site.

The ratio OC/EC ranged from 1.6 to 3.5 indicating a stronger correlation with secondary sources.

Oxalate was the most abundant ion in the samples, followed by sulfate and nitrate. Results show the influence of vehicular emissions.

Fifteen hopanes were determined in the samples. 17α(H),21β(H)-30-Norhopane was the predominant. The concentration for all hopanes were higher than previous studies, in tunnels and urban sites (Alves et al., 2016). Besides, polycyclic aromatic hydrocarbons were also determined and results show vehicular emissions influences.

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