Assessment of oxidative potential of fine aerosols from different indoor and outdoor environments

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In recent years, oxidative potential (OP) of aerosols has started to be considered as a highly relevant indicator to characterize the toxicity of particulate matter, with several studies associating OP measurements to adverse health effects (Guascito et al., 2021). Several cellular and acellular methods exist to study the OP of particles, with each one exhibiting its own characteristics. The dithiothreitol method (OP^{DTT}) has been widely applied to assess OP of aerosols and its results (for outdoor environments) have been linked to several health outcomes in epidemiological studies.

However, specific chemical species, aerosol sources and processes that affect oxidative potential of PM are still not well established. In Europe, most studies on OP of aerosols are regarding outdoor environments and, for Portugal, there are no studies at all.

This work targets to contribute to fulfil this lack of knowledge by assessing OP of fine aerosols from indoor and outdoor sources, using the OP^{DTT} method, and to categorize them. For this, $PM_{2.5}$ filters (in 47 mm quartz filters) from different environments and sources were sampled, namely:

1) Indoor: office, classroom and dwellings (sleeping environment, kitchen, and living room)

2) Outdoor: urban-industrial, street canyon, road with high traffic, rural

3) Indoor with specific emission sources: candles, traditional cigarettes, incense, ironing

OP determination of the water-soluble fraction of $PM_{2.5}$ of all samples was assessed by the dithiothreitol method at C^{2}TN (Portugal), following the methodology fully described elsewhere (Chirizzi et al., 2017). The final DTT activity of samples was normalised in terms of sampled air volume and in terms of collected aerosol mass.

Figure 1 presents the DDT activity (normalized to the sampled volume) of analysed samples until the moment. Outdoor samples (urban-industrial environment) presented the lowest levels of DDT activity (210 ± 180 pmol/min*m^3), while indoor environment with cigarette smoking presented the highest levels (9410 ± 3900 pmol/min*m^3).

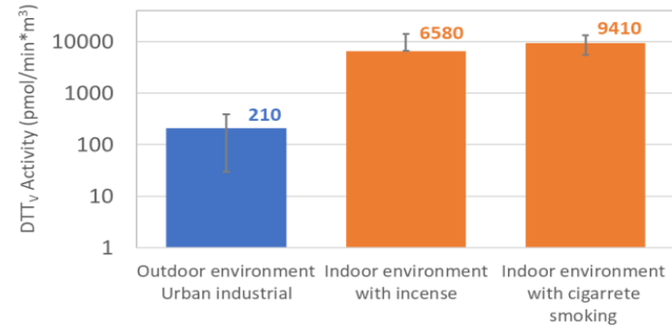

Figure 1. DTT$_v$ activity of fine aerosols from outdoor environments and specific sources.

The increasing order of OP^{DTT} of fine aerosols from different types of outdoor environments and specific sources was: outdoor environment - urban-industrial < indoor environment with incense < indoor environment with cigarette smoking.

Follow-up work will assess the remaining $PM_{2.5}$ samples, which will allow to characterise and categorize all studied environments and sources, regarding their potential health impact using OP^{DTT} as a surrogate.

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Chirizzi et al. (2017) Atmos. Environ. **163**, 1-7.
Guascito et al. (2021) Atmosphere-Basel **12**, 531.