Title: Size-segregated chemical composition of aerosol emissions in an urban road tunnel in Portugal

Author(s): Pio, Casimiro; Mirante, Fatima; Oliveira, Cesar; Matos, Manuel; Caseiro, Alexandre; Oliveira, Cristina; Querol, Xavier; Alves, Celia; Martins, Natércia; Cerqueira, Mario; Camoes, Filomena; Silva, Hugo; Plana, Feliciano

Source: Atmospheric Environment Volume: 71 Pages: 15-25 DOI: 10.1016/j.atmosenv.2013.01.037 Published: Jun 2013

Document Type: Article

Language: English

Abstract: An atmospheric aerosol study was performed in 2008 inside an urban road tunnel, in Lisbon, Portugal. Using a high volume impactor, the aerosol was collected into four size fractions (PM0.5, PM0.5-1, PM1-2.5 and PM2.5-10) and analysed for particle mass (PM), organic and elemental carbon (OC and EC), polycyclic aromatic hydrocarbons (PAH), soluble inorganic ions and elemental composition. Three main groups of compounds were discriminated in the tunnel aerosol: carbonaceous, soil component and vehicle mechanical wear. Measurements indicate that Cu can be a good tracer for wear emissions of road traffic. Cu levels correlate strongly with Fe, Mn, Sn and Cr, showing a highly linear constant ratio in all size ranges, suggesting a unique origin through sizes. Ratios of Cu with other elements can be used to source apportion the trace elements present in urban atmospheres, mainly on what concerns coarse aerosol particles. (C) 2013 Elsevier Ltd. All rights reserved.

Author Keywords: Road vehicle aerosol emissions; Road tunnel experiments; Aerosol size segregated composition; Carbonaceous aerosol; Trace elements; Soluble ions

Keywords Plus: Particulate matter emissions; Trace metal concentrations; Secondary organic carbon; Road; Source apportionment; Street dusts; Kaisermuhlen-tunnel; Motor vehicles; Mass-balance; Hong-Kong

Reprint Address: Pio, C (reprint author) - Univ Aveiro, Dept Environm & Planning, CESAM, Campus Santiago, P-3810193 Aveiro, Portugal.

Addresses:
[1] Univ Aveiro, Dept Environm & Planning, CESAM, P-3810193 Aveiro, Portugal
[6] Univ Aveiro, Ceram & Glass Engn Dept, CICECO, P-3810193 Aveiro, Portugal

E-mail Addresses: casimiro@ua.pt

Funding:

<table>
<thead>
<tr>
<th>Funding Agency</th>
<th>Grant Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portuguese Science Foundation</td>
<td>PTDC/AMB/65699/2006</td>
</tr>
</tbody>
</table>

Publisher: Pergamon-Elsevier Science LTD

Publisher Address: The Boulevard, Langford Lane, Kidlington, Oxford OX5 1GB, England

ISSN: 1352-2310

Citation: PIO, Casimiro; MIRANTE, Fatima; OLIVEIRA, Cesar; MATOS, Manuel; CASEIRO, Alexandre; OLIVEIRA, Cristina; QUEROL, Xavier; ALVES, Celia; MARTINS, Natércia; CERQUEIRA, Mario; CAMOES, Filomena; SILVA, Hugo; PLANA, Feliciano - Size-segregated chemical composition of aerosol emissions in an urban road tunnel in Portugal. Atmospheric Environment, ISSN 1352-2310. Vol. 71 (2013), p. 15-25.