



Emissions from fireplace and woodstove combustion of prevalent Portuguese woods

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In Portugal, it was estimated that around 390000 ton/year of wood is burned in fireplaces, although the chemical characterisation of emission profiles has not yet been performed. Emission inventories and source apportionment, photochemistry and climate change models use values obtained for American or Alpine wood-fuels, uncommon in South Europe. Previous work has suggested that the species of wood used can have a huge influence on the particle emissions. Since the distribution of compounds emitted differs by species and burning conditions and there are many variations among published profiles, it is desirable to obtain specific data at a regional level on the chemical characterisation of wood smoke.

A series of source tests was performed to compare the emission profiles from the woodstove combustion to those of fireplaces. Eight types of biomass were burned in the laboratory: seven species of wood grown in Portugal (*Pinus pinaster*, *Eucalyptus globulus*, *Quercus suber*, *Acacia longifolia*, *Quercus faginea*, *Olea europea*, *Quercus ilex rotundifolia*), and briquettes of biomass residues. The gas sampling was carried out in the exhaust ducts of both combustion systems. The collection of particles (PM_{2.5}) was conducted in the dilution tunnel that was directly coupled to the chimney. Dilution sampling was used to characterise fine particle emissions from the combustion sources because it simulates the rapid cooling and dilution that occurs as exhaust mixes with the atmosphere. During each burning cycle, the concentrations of O₂, CO₂ and CO, as well as operational parameters (e.g. temperatures, flows, etc.), were automatically monitored. The PM_{2.5} samples were analysed by a thermal optical technique in order to obtain their organic carbon (OC) and elemental carbon (EC) content.

It has been observed that fireplace emissions are higher than those of stoves. The emission factors were in the ranges 43 - 149 g CO/kg, 326 - 2699 g CO₂/kg, 3 - 25 g PM_{2.5}/kg, 1.34 - 12.0 g OC/kg and 0.16 - 1.25 g EC/kg of biomass burned on a dry basis. Very significant differences among emission factors for the different combusted wood species have not been registered.