# Volatile and $PM_{10}$-bound organics in a hairdressing salon

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Several activities performed in hair salons contribute to poor air quality. The use of hair and cosmetic products leads to emission of large amounts of gaseous and particulate compounds, which remain airborne in the work environment and are inhaled by hairdressers and their clients (Labrèche, 2003). Exposure to these compounds has been associated with skin and respiratory disorders, carcinogenicity, reproductive and genotoxic effects (Tsigonia, 2010). Several studies have characterized the occupational exposure to volatile compounds in hairdressing salons, but only few researches have measured the exposure levels of particles.

In this work a detailed characterization of particles ($PM_{10}$) and volatile organic compounds (VOCs) have been carried out during a sampling campaign from 20$^{th}$ to 24$^{th}$ November 2017 in a hairdresser salon in the city of Léon, Spain. The salon offers manicures, pedicures, waxing services and hair styling and coloring. $PM_{10}$ sampling was performed during the occupancy period simultaneously indoors and outdoors, and only indoors during the non-occupancy period (nighttime samples). $PM_{10}$ were collected on quartz fiber filters using a high-volume air MCV (model CAV-A/mb) instrument. Two circular punches (⌀ 47 mm) from each filter were consecutively extracted with dichloromethane and methanol. The total extract was separated into five different organic fractions by flash chromatography and analyzed by gas chromatography–mass spectrometry (GC–MS). The compounds containing hydroxylic and carboxylic groups were derivatized to trimethylsilyl ethers before injection. VOCs were collected indoors during the working hours on tenax/sulphicarb tubes (Gradko) at a flow rate of 50 mL min$^{-1}$ and analyzed by GC–MS.

Daily indoor concentrations of particulate organic compounds and VOCs were highly variable and affected by the number of customers, as well as different kinds of treatments. Generally, indoor concentrations of each pollutant were significantly higher than its outdoor concentrations.

The organic components identified in the solvent soluble fraction of $PM_{10}$ included alkanes, polycyclic aromatic hydrocarbons (PAHs), saccharides, phenolic compounds, aliphatic alcohols, carboxylic acids, sterols, among others. The aliphatic fraction comprised the homologous series of n-alkanes and n-alkenes in the range from $C_{11}$ to $C_{37}$, and from $C_{14}$ to $C_{23}$, respectively. About 20 PAHs and 6 plasticizers were also determined. *n*-Alkanols, phenolics and saturated fatty acids were the most abundant classes among oxygenated organic compounds. Among the identified VOCs in the indoor air of the hairdressing salon, toluene showed the highest concentrations (Figure 1).

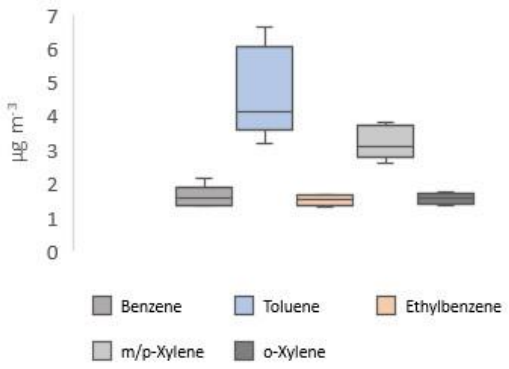


Figure 1. Average concentrations of VOCs in indoor samples.

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