Geophysical Research Abstracts,
Vol. 11, EGU2009-13382, 2009
EGU General Assembly 2009

{Polycyclic aromatic hydrocarbons (PAHs) and aliphatic hydrocarbons in gas and particle phases in two sites of Mexico: MILAGRO project}

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Aliphatic hydrocarbons are markers of anthropogenic and biogenic emission sources[1]; meanwhile PAHs are generated by incomplete combustion sources[2]. The last ones are important compounds due to their carcinogenic and mutagenic properties[3,4]. The aim of this study was to identify and quantify aliphatic hydrocarbons and PAHs in gas and particles phases of the atmospheric aerosol and to determine the day and night time behavior during the MILAGRO (Megacity Initiative: Local Global and Research Observations) campaign. The gas phase was collected on polyurethane foam, while particles less than 2.5 μm ($PM_{2.5}$) were collected on glass fiber filters covered with Teflon (TIGF, pallflex) of 8x10 in. Samplings were carried out with a high volume sampler (Tisch) with a flow of 1.13 m^3 min^{-1} at two sites: Instituto Mexicano del Petróleo (T0) and Tecamac (T1) located at North and Northeast of Mexico City, respectively during day (7:00 am-7:00 pm) and night time (7:00 pm-7:00 am) from 1 to 29 of March, 2006. Ninteen PAHs and 23 aliphatic hydrocarbons from n-$C_{13}H_{28}$ to n-$C_{35}H_{72}$ were analyzed by gas chromatography coupled to mass spectrometry in impact mode. The samples were spiked with deuterads PAHs and aliphatics hydrocarbons before ultrasound extraction. Medians comparisons were made with Mann-Whitney U test. PAHs with molecular weight (MW) less than 228 g mol^{-1} were distributed in the gas phase, in both sites. Higher concentrations of PAHs $\geq$ 228 g mol^{-1} in $PM_{2.5}$, were observed during night period ($p<0.05$) for both sites. Phenanthrene was the PAH most abundant in the gas phase in both sites; while in the particle phase was benzo[*ghi*]perylene in T0, and fluoranthene and pyrene in T1. n-heptacosane was the aliphatic hydrocarbons most abundant in the gas phase, while n-pentacosane and n-hexacosane were in the particle phase. Higher mass concentrations for acenaphthylene, acenaphthene, fluorene, phenanthrene and anthracene during night time ($p<0.05$), suggest photochemical degradation during day time, similar behavior occurred with n-$C_{13}H_{28}$ to n-$C_{17}H_{36}$ in both sites. A particular case was observed for acenaphthylene with a reduction in the concentration more than 80 % during day time respect to night time. An opposite behavior for n-alkanes from n-$C_{19}H_{40}$ to n-$C_{22}H_{46}$ was observed, with higher concentrations during day time ($p<0.05$). Mass concentrations of $C_{18}H_{38}$ and from $C_{23}H_{48}$ to $C_{35}H_{72}$ were similar between day time and night time in both sites. Aliphatic hydrocarbons did show different gas/particle distribution than PAHs as a function of their MW. Probably their distribution is more related with the non-polar character[5,6]of aliphatic hydrocarbons compared to that of PAHs, than with their vapor pressure, making them less particle-affinity. These observation are still under study. Authors acknowledge to projects: PAPIIT No. IN230307 and SEMARNAT-CONACYT-2004-C01-116 by financial support. [1] - Cincinelli A. et al. (2007). Chemosphere 68, 472, [2] - ATSDR (1995). Toxicology profile for polycyclic aromatic hydrocarbons, US Department of Health and Human Services, Atlanta, G.A., [3] – IARC (1983). Polynuclear aromatic compounds, part 1, chemical, environmental and experimental data. Summary of data reported and evaluation, In: IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, World Health Organization, International Agency for Research on Cancer. Updated 1998, [4] – Villalobos-Pietrini, R., et al. (2007) Mutation Research 634, 192, [5] – Khanal O. and Shooter D. (2004). Atmos. Environ. 38, p. 6917, [6] – Verschuerene K. (2001). Handbook of environmental data on organic Chemicals. Wiley, New York.