Polycyclic aromatic hydrocarbons in particles less than 2.5 μm in two sites at northeast of Mexico City. MILAGRO Campaign

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The polycyclic aromatic hydrocarbons (PAH) are ubiquitous environmental pollutants mainly produced from incomplete combustion and pyrolysis of carbonaceous materials and fossil fuels including coal, oil and oil shale from several natural and anthropogenic sources. Their presence in atmospheric particles represents a health risk for human health, due to well documented genotoxic and carcinogenic properties (Kennish 1996, Neilson 1998). PAH with 2-3 rings are largely in the vapor phase, those with 4 rings are in vapor and particulate phases and PAH with 5 and more rings are on particulate phase (Arey et al. 1987, Coutant et al. 1988, Ligocki and Pankow 1989). PAH are associated mainly with sub-micron-sized particles increasing the probability to get deeply into lung alveoli when these particles are inhaled. In this study, nineteen PAH were analyzed in particles less than 2.5 μm ($PM_{2.5}$) collected on fiber glass filter covered with Teflon (preheated), employing two high volume samplers. The samplings were carried out simultaneously from 7:00 am to 7:00 pm from 1st to 29th of March of 2006 at Instituto Mexicano del Petróleo (IMP) and Tecamac (TEC), denoted as T0 and T1 sites, respectively, at northeast of Mexico City during MILAGRO Campaign. The filters were spiked with nineteen PAH full deuterated before the extraction in an ultrasound bath with methylene chloride (HPLC grade) as extraction solvent. All organic extracts were analyzed by gas chromatography- quadrupole mass spectrometry in electronic impact and selected ion monitoring mode for the quantitative analysis. PAH with 3 or more rings were employed for the statistical analysis. Higher average concentrations of total PAH were observed during night samplings than for days samplings for T0 (8.3±3.7 ng m^{-3} vs. 4.6±1.9 ng m^{-3}, $p<0.01$) and T1 (5.6±2.2 ng m^{-3} vs. 2.8±0.8 ng m^{-3}, $p<0.001$). Higher concentrations were found in T0 than in T1 in both day ($p<0.05$) and night periods ($p<0.05$). Anthracene was the PAH with the lowest average concentrations (53-88 pg m^{-3}) in all samplings in both sites, however, benzo[*ghi*]perylene was the PAH with the highest average concentration for T0 (980-1657 pg m^{-3}), while pyrene was for T1 (567-934 pg m^{-3}). Acknowledgments: Projects FOSEMARNAT C409-2004, FOSEMARNAT 2004-CO1-48 and FOSEMARNAT 2004-CO1-116, PAPIIT 1N230307 and to Tin Tran for English correction.

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