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Ammonia determination in a roadway tunnel of the metropolitan area of Sao Paulo, Brazil

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The degradation in air quality has been one of the most serious health problems afflicting the more than 19 million inhabitants of the metropolitan area of Sao Paulo (MASP). There are more than 7.5 million vehicles being 40% running with ethanol as fuel, 80% using a 3-way catalyst, and 15% being flex-fuel. This vehicular fleet is the main responsible for the air pollution problems, highlighting the aerosol. The different evaluations of the ionic composition of the aerosol and rainwater samples of the MASP showed the importance of the ammonium, from ammonia gas phase incorporated in liquid or solid atmospheric phase. Ammonia is the third most abundant nitrogen compound in the atmosphere, and whose global emissions are mainly from biogenic sources. Despite its short residence time it has a significant role influencing the acidity of cloud water and the formation of secondary aerosols. The purpose of this work is to evaluate the ammonia in urban area and in a roadway tunnel, with intense light vehicles traffic. The air sampling was carried out inside and outside the Janio Quadros roadway tunnel in MASP between 5 and 10 May, 2011 by using a simplified impinger system with 1.0 mmol L-1 H2SO4 solution, 1 L min-1 flux during 1 h. The ammonium measurements were carried out by a flow injection system using gas-diffusion and coupled contactless conductivity detection. The results point out that the number and the velocity of the vehicles influence on the ammonia concentration in both site sampling. The ammonia concentrations were twice higher inside the roadway tunnel, reaching the maximum value of 98 ?g m-3, with mean value of 48.1 (?15.4) ?g m-3. These data suggest that atmospheric ammonia is not only restricted to biogenic emissions, but also by vehicles in the MASP. Consequently, more regional assistance should be given to the sources of this compound, considering the increase of the megacities in the world and their effects on the global emissions.