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VOCs in the urban atmosphere of San Salvador, El Salvador, Central America

C. Coello (1), D. Nolasco (1), V. Pérez (1), R. Gómez Escoto (2), R. Pichinte (2), P.A. Hernández (1) and N. M. Pérez (1)

(1) Environmental Research Division, ITER, 38594 Granadilla, Tenerife, Canary Islands, Spain, (celeste@iter.es), (2) Facultad de Ciencias Naturales y Matemáticas, Universidad de El Salvador, San Salvador, El Salvador, Central America

Volatile Organic Compounds (VOCs) in the ambient air are indicative of the quality of the atmosphere. Since the early 1950s, it has been known that VOCs in the air play a major role in the formation of photochemical smog. Tropospheric ozone, a very reactive oxidising agent, is a product of the photochemical processes associated with air pollution. This secundary pollutant forms due to chemical reactions involving oxides of nitrogen (NO_x) and VOCs in presence of sunlight (Simpson et al., 1995). Additionally, many VOCs are toxic or carcinogenic for humans and animals above certain doses (Ashford and Miller, 1998). The role of the VOCs as precursors to the ozone formation in the troposphere and their potential impact on the human health have become an important issue for the international policy strategy on air pollution (COM, 1999). VOCs in the ambient air not only comprise a broad spectrum of volatile species, but also are produced by a wide variety of sources The main sources of VOCs emission to the atmosphere are due to man's activities and primarily related to (1) combustion processes, (2) production, treatment, storege, and distribution of fossil fuels, (3) application of volatile organic solvents and solvent-containing products, (4) industrial production processes and (5) biological processes (Friedrich and Obermeier, 1999). Road traffic is one the most significant source of primary air pollutants in the industrialized world, and specially for VOCs components. The aim of this study is to evaluate the levels of VOCs in the ambient air of the city of San Salvador, a megametropolis of 2 million people, using US-EPA Method TO-14. San Salvador is located in a depression geographical environment between two major volcanoes and face an intensive daily road traffic of vehicles which are not subject to a car gas exhaust control system.

A survey of 16 air samples from the urban environment of San Salvador were collected at 16:00 hours on July 1, 2004. Air samples were taken by grab-sampling in 400 cm^3 stainless-steel canister. VOCs analysis of 34 volatile components were carried out by means of GC/MS/MS and they were grouped into three categories: aromatic hydrocarbons, chlorinated hydrocarbons, organohalogen. The results showed the detection of 10 components, and the most dominant VOCs found were benzene, toluene, ethybenzene and xilenes (BTEX). The average BTEX concentration values in the urban atmosphere of San Salvador were 3.27, 28.7, 1.76 and 2,80 ppb, respectively. These values are higher than those observed for US cities (Kim et al., 1997). The highest benzene concentration was 11.50 ppb, which is also higher than the hourly limit value established by the Directive 2000/69/CE of the European Union, 1,54 ppb. Since industrial emissions are not concentrated in the city of San Salvador, these results implies that road traffic is the most important source VOCs to the urban atmosphere of San Salvador and suggest the establishment of a car gas exhaust control system to reduce gas emissions due to road traffic.

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