

TVOC MEASUREMENTS AND GCMS SPECTRUMS AT SELECTED POLLUTED ENVIRONMENTS IN SRI LANKA

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Abstract

Air Pollution is not a recent phenomenon; it is one of the world's oldest environmental problems (Brimblecombe, 1987; Reese, 1999). Nevertheless attention was increased with global industrialization. Recent years we are encountered with air pollution due to invisible pollutants such as volatile organic compounds (VOCs). VOCs on the Earth's atmosphere are emitted from a wide variety of biogenic and anthropogenic sources. The main concerns on indoor VOCs are due to adverse health impact while outdoor VOCs is due to the ability to create photochemical smog under certain conditions.

Eleven different Total-VOC (TVOC) monitoring sites were identified for detailed measurements. Real time TVOC measurements for 10 minutes (reporting every minuted data) from all sites were carried out using Photo Ionization Detectors (PID), EW technologies, USA. Its photoionization detector range of 0 to 1 ppm and commonly used for indoor research. Selected sites for TVOC measurements were: wood using cook stove area; LPG using cook stove area; petroleum station; vehicle spray paint area; tobacco smoking area; incense sticks burning area; outdoor polythene/ and other garbage burning area; vehicle service area; mosquito coil burning area; kerosene using cook stove area and kerosene lamp burning area. Measurements were conducted 1ft, 5ft and 10ft. Further to understand the detailed VOC species air samples were collected using Teflon air bags for the above mentioned eleven different TVOC monitoring sites. 5 liter Screw cap valve Tedlar bags were used to collect the air samples at each location. Sample collection time was 10 minutes. Collected samples were kept inside a black bag (to minimize the photochemical reactions). Air-conditioned vehicle was used to transport the air bag samples to the laboratory for immediate Gas GCMS analysis to minimize further reactions. Air samples were analyzed using the GCMS available at the University of Colombo at the Department of Chemistry. USEPA Method (EPA TO-14A/TO-15 mod- Volatile Organic Compounds by GC-MS) was followed for the analysis to identify the detail VOC compounds at each location. For the quantification of the VOC species two standard VOC mixtures were used namely; USEPA Volatile

Organic Compounds Mix 2 and Mix 8, 2000 μ g/ml in methanol. To obtain the clear spectrums, head space samples were also analyzed using GCMS.

Results showed that highest TVOC was observed at petroleum station; vehicle spray paint area; kerosene using cook stove area. Further, major VOC components emitted from the sources were identified and some of them are highly carcinogenic components available in the ambient air in Sri Lanka. The results are very valuable for the Sri Lankan Policy makers and necessary awareness for the general public is a must. Further standards need to introduce for VOC emitting components, thereby reducing the air pollutant levels for most carcinogenic component in the ambient air.

Keywords: Air Pollution, Volatile Organic Compounds, GCMS Spectrum, Colombo