Determination of NO\textsubscript{x} and SO\textsubscript{2} concentration levels in Nairobi city, Kenya by use of passive samplers

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A Thesis Submitted in Partial Fulfillment for the Degree of Master of Science in Chemistry in the Jomo Kenyatta University of Agriculture and Technology

2010
ABSTRACT

This research work describes the determination of the levels of nitrogen monoxide, nitrogen dioxide (termed as NO\textsubscript{X}) and sulphur dioxide (SO\textsubscript{2}) in Nairobi city by use of passive sampling method. In this technique, Triethanolamine (TEA) and potassium tetrachloromercurate (TCM) solutions were used as trapping agents and air samples which were sampled from twelve sites within Nairobi city were analyzed spectrophotometrically. The detection limit of passive sampling method was found to be 7µg/m\textsuperscript{3} and 4 µg/m\textsuperscript{3} and precision was 4 µg/m\textsuperscript{3} and 3 µg/m\textsuperscript{3} for NO\textsubscript{2} and SO\textsubscript{2}, respectively for a 24-hour sampling. The highest 24-hour mean concentrations of NO\textsubscript{X} and SO\textsubscript{2} were recorded at City Kabanas site along Nairobi-Mombasa road with 300.61 8.21 µg/m\textsuperscript{3} and 181.35 2.46 µg/m\textsuperscript{3}, respectively and the lowest mean concentrations of NO\textsubscript{X} and SO\textsubscript{2} were recorded at Githurai site with 169.92 6.12 µg/m\textsuperscript{3} and 85.60 0.78 µg/m\textsuperscript{3}, respectively. The overall mean levels for these air pollutants were; 82.87 ± 6.13 µg/m\textsuperscript{3} for NO, 136.78 ± 9.72 µg/m\textsuperscript{3} for NO\textsubscript{2} and 127.66 ± 10.45 µg/m\textsuperscript{3} for SO\textsubscript{2}. The recorded level of NO\textsubscript{2} in Nairobi troposphere was found to be above the WHO value of 100µg/m\textsuperscript{3}, that of SO\textsubscript{2} was within the WHO value of 125µg/m\textsuperscript{3} and that of NO was below the WHO value of 400µg/m\textsuperscript{3}. Furthermore, it was found that levels of NO\textsubscript{X} and SO\textsubscript{2} recorded during the dry season were higher than those of the wet season. The trend of levels of NO\textsubscript{X} and SO\textsubscript{2} followed the vehicular density and areas with high vehicular traffic and industrial activities had high levels of NO\textsubscript{X} and SO\textsubscript{2}. 