

Determination of NO_x and SO₂ concentration levels in Nairobi city, Kenya by use of passive samplers

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ABSTRACT

This research work describes the determination of the levels of nitrogen monoxide, nitrogen dioxide (termed as NO_x) and sulphur dioxide (SO_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 $7\mu\text{g}/\text{m}^3$ and $4\mu\text{g}/\text{m}^3$ and precision was $4\mu\text{g}/\text{m}^3$ and $3\mu\text{g}/\text{m}^3$ for NO_2 and SO_2 , respectively for a 24-hour sampling. The highest 24-hour mean concentrations of NO_x and SO_2 were recorded at City Kabanas site along Nairobi-Mombasa road with $300.61\ 8.21\mu\text{g}/\text{m}^3$ and $181.35\ 2.46\mu\text{g}/\text{m}^3$, respectively and the lowest mean concentrations of NO_x and SO_2 were recorded at Githurai site with $169.92\ 6.12\mu\text{g}/\text{m}^3$ and $85.60\ 0.78\mu\text{g}/\text{m}^3$, respectively. The overall mean levels for these air pollutants were; $82.87 \pm 6.13\mu\text{g}/\text{m}^3$ for NO , $136.78 \pm 9.72\mu\text{g}/\text{m}^3$ for NO_2 and $127.66 \pm 10.45\mu\text{g}/\text{m}^3$ for SO_2 . The recorded level of NO_2 in Nairobi troposphere was found to be above the WHO value of $100\mu\text{g}/\text{m}^3$, that of SO_2 was within the WHO value of $125\mu\text{g}/\text{m}^3$ and that of NO was below the WHO value of $400\mu\text{g}/\text{m}^3$. Furthermore, it was found that levels of NO_x and SO_2 recorded during the dry season were higher than those of the wet season. The trend of levels of NO_x and SO_2 followed the vehicular density and areas with high vehicular traffic and industrial activities had high levels of NO_x and SO_2 .