

MONITORING AIR QUALITY AT GALAHA JUNCTION USING ACTIVE AND PASSIVE SAMPLING TECHNIQUES

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The area around Galaha Junction at Peradeniya is heavily polluted due to the large number of motor vehicles passing through this junction and several bus stops. Thus, it was considered important to study the levels of pollutants at this site. The present study has been carried out to determine three pollutants, NO₂, SO₂ and O₃, using both passive and active sampling methods. The sampling period was from 18th December 2003 to 20th May 2004.

Passive sampling is a simple, environmentally friendly and a low-cost method. The samplers were made using Teflon. A paper filter impregnated with an absorbing solution was kept inside the sampler. This is capable of trapping gaseous pollutants from the atmosphere through molecular diffusion. Loaded samplers were exposed for 4-5 days at the site, and after that trapped pollutants were extracted into deionized water. Dissolved ions were analyzed using colorimetric and turbidimetric methods in the laboratory.

Active sampling was carried out using air samples to determine the hourly variations of the pollutant levels. The air was pumped into a special absorbing solution using calibrated Gil Air3 model Gilian air pump. The solutions were analyzed using standard methods in the laboratory to obtain pollutant concentrations.

During this study, 20 sets of data were obtained in the passive sampling method at Galaha Junction. The measured 24 h average concentrations of pollutants were in the range of 0.029-0.048 ppm with a median value of 0.046 ppm for SO₂, 0.033- 0.063 ppm with a median value of 0.057 ppm for NO₂ and 0.034-0.082 ppm with a median value of 0.074 ppm for O₃. These values exceeded the recommended Sri Lankan standards on about 61.0%(SO₂), 26.4%(NO₂) and 37.3%(O₃) occasions. Remarkably high values were obtained during school days and under dry weather conditions. Results obtained during school vacation in April showed higher values than those obtained during the vacation in December. This may be due to increased vehicular traffic during the Sinhala New Year and the exposition of the Tooth Relic this year during this period.

The hourly variations of SO₂ and NO₂ showed higher values during the morning rush hour (7:00 a.m. – 8.00 a.m.) and the concentrations of pollutants decreased during day time. Again higher values were obtained between 1:00 p.m. – 3:00 p.m. This is the period during which there is heavy traffic after closure of schools. The ozone levels were found to be significantly high during 11:00 a.m. and 4:00 p.m. This higher level of ozone can be correlated to the light intensity and the temperature. The observed pattern of diurnal variation is similar to the trends observed for a study done in the city of Kandy.