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Ambient air quality in Colombo city using chemical constitution of PM_{10}

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Clean air is an essential basic need of all living beings and purity of air we breathe is an important factor of human health. Over 80 % of country's industrialization, over 60 % of vehicles, and over 90 % of thermal power plants are found within the boarders of the Colombo metropolitan region. Hence monitoring of ambient air quality in city of Colombo was needed for policy planning and it has been started since 1996. Monitoring results showed that particulate matter (PM_{10}) is the major pollutant and it indicated that annual average of PM_{10} exceeded the standard value (20µg/m^3) stipulated by WHO throughout the monitoring period. Therefore this study was focused on the chemical constitution of PM_{10} samples collected during 2005 and 2006, to study the ambient air quality in the Colombo city.

PM_{10} samples were collected from the ambient air quality monitoring site at Fort, Colombo using a high volume air sampler by the Laboratory of the Central Environmental Authority. Elements such as Al, K, Ti, V, Cr, Mn, Fe, Ni, Br and Pb were analyzed using X-Ray Fluorescence spectrometer. Carbons (Organic and Inorganic) were analyzed using gas chromatography. Extracted solutions of PM_{10} filter papers were used to analyze cations/anions using Ion Chromatography.

A total of 159 samples were analyzed and elements were identified in percentage as follows: Iron-3.77%, Aluminium-2.18%, Potassium-2.63%, Bromine-0.29%, Titanium-0.16%, Vanadium-0.04%, Lead-0.03%, Chromium-0.29%, Manganese-0.013%, Nickel-0.01% and 93.4% were not detected. Results of the Gas Chromatography analysis shows that total carbon consist of 37% of PM_{10}, and of which 20% was organic carbon and 17% was inorganic carbon.

Based on the pilot analysis, there are five major anions and cations, which were identified as a percentage. Anions consisted as 14.29% Sulphate, 9.85% Chloride, 4.61% Nitrite, 0.25% Nitrate, 0.11% Fluoride and cations consisted as 12.45% Sodium, 2.84 Calcium, 1.53% Potassium, 077% Magnesium and 0.34 % Ammonium. Constitutions of 10.6 % of this PM_{10} were not detected. These results can be used for Chemical Mass Balance Model to trace emission sources, which can be used for policy development on air pollution control.

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