E1-14: Elemental analysis of PM–10 air particulates using a nuclear related analytical technique

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Air particulate matter of 2 size fractions (coarse - 2.5 - 10μm and fine <-2.5μm) was collected at an urban residential site (Colombo University Ground) over a period of 12 months during 1996 using a "Gent" PM-10 stacked filter unit. Seventy Five sets of samples collected during this period were analyzed to ascertain trace elements by Energy Dispersive X-ray fluorescence Analysis. This technique provides a multi-element analysis quantitatively with high sensitivity enabling analysis of very low mass. Al, Si K, S, Ca Ti, Fe, Zn, Br, Pb have been identified as present in the fine and coarse filters analysed. Measured 24h average concentration of lead was 0.09 $\mu g/m^3$ in particulate matter less than 10 μm in diameter.

S and Pb are elements that are generally associated with combustion products and therfore dominate the fine fraction rather than the coarse fraction, i.e. particles of size less than 2μm can be attributed mainly to combustion processes or gas to particle conversion. Pb and Br show good correlation when associated with combustion of petrol by motor vehicles. Br is commonly used as an indicator of auto exhaust Lead with a ratio of around 3 in Sri Lanka. Particles larger than 2 μm are mostly derived from mechanical processes. (eg soil erosion). It can be significantly shown than Fe, Ti, Ca, Si and Al dominate the coarse fraction than the fine fraction.

The maximum measured PM-10 and PM 2.5 values are 217.53 $\mu g/m^3$ and 89.55$\mu g/m^3$. The minimum measured PM 10 and PM 2.5 values are 19.63 $\mu g/m^3$ and 7.85$\mu g/m^3$, resulting an annual average of PM-10 and PM 2.5 measured as 75.12$\mu g/m^3$ and 26.32$\mu g/m^3$.

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