

HEAVY METAL CONTAMINATION IN ROAD DUST FROM COLOMBO- KATUNAYAKE EXPRESSWAY, E03

L.W.V. Priyadarshana

Postgraduate Institute of Science, University of Peradeniya, Peradeniya, Sri Lanka
Department of Chemistry, University of Kelaniya, Kelaniya, Sri Lanka

Surface dusts are a complex environmental media and often contain elevated concentrations of inorganic and organic pollutants such as heavy metals, metalloids, and polycyclic aromatic hydrocarbons. Their composition reflects inputs from variety of sources, including water transported material from surrounding soils, dry and wet atmospheric deposition, road surface wear, road paint degradation, vehicle wear (tires, body, brake linings, etc.), vehicle fluid and particulate emissions.

Use of road dusts as a background investigation of heavy metal concentrations has been used to identify the level of pollution and this study was conducted to investigate the concentrations of five heavy metals (Pb, Cu, Cr, Zn and Ni) in road dusts along the newly built Colombo - Katunayake Expressway (E03). Surface dusts and soil by the roadside were collected at every 2 km from 26 sampling points up and down along the expressway in four different function areas, Function areas were classified as (A) Area open to Colombo to 13th kilometer post, (B) 13th kilometer post to Katunayake end (C) Area open to Katunayake to 13th kilometer post and (D) 13th kilometer post to Colombo end. Heavy metals in road dust and soil samples by the roadside were analyzed using atomic absorption spectrophotometry (AAS).

The concentrations of metals in road dust are expressed in mg kg⁻¹ of the dry weight of the dust sample. Concentrations of lead were found in the range of 14.15-121.60 mg kg⁻¹ with a mean value of 34.39 (±1.84) mg kg⁻¹. The average concentration of Cu in road dust samples were 101.86 mg kg⁻¹ with a range of 33.05-241.80 mg kg⁻¹ with a mean value of 34.39 (±1.84) mg kg⁻¹. The average concentrations of Cr, Zn and Ni were obtained as 78.56 (±10.50), 284.01 (±42.30), 28.17 (±4.30) mg kg⁻¹ respectively in road dust samples and the level of heavy metal contamination was compared with the background samples obtained from Uda-Peradeniya road, Kandy, where the anthropogenic influence is comparatively low.

The contamination factors and Enrichment factors revealed that moderate contamination and considerable contamination of the heavy metals across the E03 expressway road dust samples and the main source of heavy metal concentration of the road dust is not only from natural processes but also due to human related activities. The overall Igeo values range along E03 Expressway from unpolluted to moderately polluted environment. The statistical analysis revealed that there is no significant difference of all the heavy metal concentrations in all A, B, C and D function areas of the E03 expressway. In addition to that it revealed that there is a significant difference of the heavy metal concentrations in road dust and soil by the roadside of the E03 expressway.