

Natural and Construction/Demolition Waste Aggregates: A Comparative Study

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Abstract : Disposal of construction and demolition waste (C&DW) in embankments in the periphery of cities causes both environmental and social problems. To achieve the management of C&DW, a detailed analysis of the properties of these materials should be done. In this work we report a comparative study of the physical, chemical and environmental properties of natural and C&DW aggregates from 25 different origins. Assays were performed according to European Standards. Analysis of heavy metals and organic compounds, namely polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs), were performed. Finally, properties of concrete prepared with C&DW aggregates are reported. Physical analyses of C&DW aggregates indicated lower quality properties than natural aggregates, particularly for concrete preparation and unbound layers of road pavements. Chemical properties showed that most samples (80%) meet the values required by European regulations for concrete and unbound layers of road pavements. Analyses of heavy metals Cd, Cr, Cu, Pb, Ni, Mo and Zn in the C&DW leachates showed levels below the limits established by the Council Decision of 19 December 2002. Identification and quantification of PCBs and PAHs indicated that few samples shows the presence of these compounds. The measured levels of PCBs and PAHs are also below the limits. Other compounds identified in the C&DW leachates include phthalates and diphenylmethanol. The characterized C&DW aggregates show lower quality properties than natural aggregates but most samples showed to be environmentally safe. A continuous monitoring of the presence of heavy metals and organic compounds should be made to trial safe C&DW aggregates. C&DW aggregates provide a good economic and environmental alternative to natural aggregates.

Keywords : concrete preparation, construction and demolition waste, heavy metals, organic pollutants

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