

Potential low cost materials for permeable reactive barriers to treat ground water polluted with landfill leachate in Sri Lanka: A review

P. G. R. C. J. Gamlath^a, C.S. Kalpage^a and G. B. B. Herath^b

^aDepartment of Chemical and Process Engineering, Faculty of Engineering, University of Peradeniya;

^bDepartment of Civil Engineering, Faculty of Engineering, University of Peradeniya;

charitha_gamlath@yahoo.com

Open dumping is the most common form of solid waste handling in Sri Lanka, which results in the formation of a leachate that eventually mixes with ground water, and then with surface water used directly for human consumption. Installation of permeable reactive barriers (PRB) as an *in situ* technique to treat ground water has become popular recently due to their lower operational and maintenance costs compared with traditional pump and treat technique¹. Selecting low-cost and durable materials for PRB depends on factors such as the physical and chemical composition of the PRB material, the composition of the leachate, local availability of the material, associated costs, maintenance, etc.

A literature review identified that the levels of COD and that of heavy metals such as Chromium, Selenium, Iron (Fe), Zinc, Arsenic and Lead (Pb) in the areas of Kolonnawa, Hambanthota, Rathnapura, Matale, Negombo, Matara and Galle exceed the national limits set out by the National Environment Act No. 47 of 1980. In order to essentially remedy the high levels of organic content and heavy metals, four locally available low cost materials; roof tile rubble, saw dust, coco peat and appetite were identified as being useful². The mechanism of contamination reduction by the above materials is a combination of absorption, adsorption, precipitation, chemical conversion and biologically mediated reactions.

References

1. M. M. Scherer, S. Richter, R. L. Valentine and P. J. J. Alvarez, Chemistry and microbiology of permeable reactive barriers for *in situ* ground water cleanup, *Critical Reviews in Environmental Science and Technology*, 2000, **30**, 363-411.
2. B. G. N. Sewwandi, K. Takahiro, K. Kawamoto, S. Hamamoto, S. Asamoto and H. Sato, Characterization of landfill leachate from municipal solid waste landfills in Sri Lanka, *Abstr. Intl. Conf. Sustainably Built Environments*, Kandy, Sri Lanka, 2010.