Environmental Engineering and Management Journal *January 2019, Vol.18, No. 1, 171-183*
http://www.eemj.icpm.tuiasi.ro/; http://www.eemj.eu

"Gheorghe Asachi" Technical University of Iasi, Romania

SAND TREATMENT PROCEDURES FOR CHEMICAL ANALYSIS AND BEACH SAND QUALITY

Mário Dias Almeida[1], Sónia Sousa[1], João Sebastião Rebelo[1], Lucília Vales[1], Katrin Schifferegger[2], Cristina Maria Martins Almeida[1,3*]

[1]Laboratory of Bromatology and Water Quality, Faculty of Pharmacy, Av. Prof. Gama Pinto, 1649-003- Lisboa, Portugal
[2]Marina de Vilamoura, S.A., Marina de Vilamoura, 8125-409 Quarteira, Portugal
[3]iMed, The Institute for Medicines and Pharmaceutical Sciences, Faculty of Pharmacy, Av. Prof. Gama Pinto, 1649-003- Lisboa, Portugal

Abstract

Sand contamination is an important factor when assessing the health hazard potential of public beaches. The goals of this study are to assess the performance of four sand washing procedures on the removal of surface adsorbed chemical species, and to identify which chemical components are best suited for monitoring the health quality of beach sand. Four washing treatments were investigated: contact, stirring, sonication, and boiling. Sand samples were collected from three Portuguese beaches and the wash water analysed. The observed variables were specified in two main groups: 1) physicochemical parameters comprising sulphates, pH, and conductivity; and 2) pollution indicators including nitrogen and phosphorous chemistries, chemical oxygen demand (COD), and oxidability. The Group I measurements did not exhibit significant differences with sand treatment ($p=0.89$), but there were differences in the Group II measurements due to the higher COD and oxidability values ($p<0.01$). The best extraction yield was obtained with sonication. In terms of a suitable health quality marker, neither group exhibited significant variation with beach location or sampling period of year. Individually, however, several chemical parameters were found to be significant on the basis of sampling period ($p < 0.01$) and beach location ($p < 0.001$). The COD and oxidability values were also found to vary significantly on the basis of sampling period ($p < 0.01$ and $p< 0.001$, respectively). COD was determined to the best sand quality indicator.

Keywords: beach sand, chemical indicators, chemical analysis, COD, sand treatment

Received: November, 2014; Revised final: May, 2015; Accepted: May, 2015; Published in final edited form: January, 2019

[*]Author to whom all correspondence should be addressed: e-mail: calmeida@ff.ulisboa.pt; Phone: +351 21 794 6470; Fax: +351 21 794 6470