

Magnetic and chemical characteristics of volcanogenic black sand found on a beach of Jeju Island, South Korea: remediation and beneficial use

J.Y.CHOI^{1*}, G.H.HONG¹, K.R.KIM¹ AND D.B.YANG¹

¹ Korea Institute of Ocean Science & Technology, 787, Haeanro, Ansan, 426-744, Korea

(correspondence: jychoi@kiost.ac.kr)

We investigated metal and mineral compositions of beach sands collected from Hwasun beach, Jeju Island in South Korea. Cr and Ni were abundant in Hwasun beach sand and their levels were 167 ± 45.0 and 279 ± 51.6 mg/kg, respectively, exceeding Probable Effective Level (PEL) of Cr (160 mg/kg) and Ni (42.8 mg/kg).

To examine the environmental impact and to make an optimal remediation plan, we also investigated grain-size distribution and magnetic properties of those beach sands. 375-1500 μm -sized fraction was the most abundant in sands from Hwasun beach. We collected magnetically separable particle (MSP) fraction from Hwasun beach sands and measured magnetic susceptibility of that fraction. The major compound of MSP fraction was black sands which were of volcanogenic origin and it exhibited high magnetic susceptibility with $56.0 \pm 13.5 \cdot 10^{-6}$ SI. Cr and Ni levels in MSP were significantly higher than in remained fraction. Cr and Ni levels in remained fraction did not exceed Effect range low (ERL) implying sands polluted by metal from volcanic rock could be remediated by magnetic separation method. The sorption test showed that volcanogenic black sands are efficient sorbent for concurrent removal of metals including Ni, Cu, Zn, Cr and Co from wastewaters. The removal efficiency of metals in wastewaters by magnetically separated black sands was tested in order to examine its potential use as a sorbent for wastewater treatment.