

## **Effect of soil composition in copper (II), lead (II), and zinc (II) ion adsorption capacity**

### **ABSTRACT**

The ability of soil to bind with heavy metals is related to soil adsorption capacity. Different soil compositions have different adsorption capabilities for heavy metal ions. In this study, the excess adsorption isotherm of binary adsorption by individual heavy metals ( $\text{Cu}^{2+}$ ,  $\text{Pb}^{2+}$ , and  $\text{Zn}^{2+}$ ) onto different clay–sand ratios was investigated. Five different ratios were examined (1:0, 9:1, 7:3, 1:1, and 0:1). The excess adsorption isotherm was measured using a typical batch adsorption approach, and the experimental data were interpreted using the pseudo-ideal monolayer adsorption model. The adsorption capacities ranged from 0.003 to  $1.83 \times 10^{-3}$  mg/g ( $\text{Cu}^{2+}$ ), 0.007 to  $1.62 \times 10^{-2}$  mg/g ( $\text{Pb}^{2+}$ ), and 2.0 to  $1.71 \times 10^{-5}$  mg/g ( $\text{Zn}^{2+}$ ). The results revealed that increasing the clay composition in the admixture increased the selectivity of  $\text{Pb}^{2+}$  more than  $\text{Cu}^{2+}$  and  $\text{Zn}^{2+}$ . The sequence of adsorption capacity in the non-competitive adsorption of different compositions of clay and sand showed the following heavy metal adsorption pattern:  $\text{Pb}^{2+} > \text{Cu}^{2+} > \text{Zn}^{2+}$