COMPARATIVE STUDY OF MERCURY(II) REMOVAL ONTO NATURAL AND IRON-MODIFIED ZEOLITE

Marin Ugrina,1, Teja Čeru,2, Ivona Nunić,1, Marina Trgo1

1Faculty of Chemistry and Technology, University of Split, Ruder Boškovića 35, 21 000 Split, Croatia
2Geological Survey of Slovenia, Dimičeva ulica 14, 1000 Ljubljana, Slovenia
*E-mail: mugrin@ktf-split.hr

INTRODUCTION

The contamination of soil and water bodies with Hg(II) from the anthropogenic sources such as mining and industry activities causes negative effects for living organisms due to the process of bioaccumulation and biomagnification through the food chain. Therefore, the need for remediation of contaminated areas is extremely necessary, especially if it is effective by using low-cost sorbents. This paper compares the sorption abilities of natural and iron-modified zeolite towards mercury(II) ions from aqueous solutions. The influence of pH, solid/liquid ratio, initial concentration and contact time on the sorption efficiency onto both sorbent materials was investigated.

RESULTS AND DISCUSSION

1. SAMPLE PREPARATION

From natural zeolite (NZ) is obtained iron-modified zeolite (FeZ) by sequentially treatment with 0.1 mol/L Fe(NO3)3×9H2O in an acetate buffer at pH=3.6, 1 mol/L NaOH and 4% NaNO3.

2. BATCH SORPTION STUDIES

Effect of pH: pHNZ=2.25; S/L=10 g/L; t=24h; T=25°C; c0=4.00 mM
Effect of S/L: S/L=2-80 g/L; pHNZ=2; t=24h; T=25°C; c0=4.06 mM
Effect of c0: c0=0.46-12.26 mM; S/L=10 g/L; pHNZ=2; t=24h; T=25°C
Effect of t: t=1-1440 min; c0=3.94-9.93 mM; S/L=10 g/L; pHNZ=2; T=25°C
Leaching standard test (DIN 38414): pH(ultrapure water)=2.00-12.05; S/L=10 g/L; t=24h; T=25°C, saturated NZ and FeZ

CONCLUSION

Both sorbent materials could be used for in situ remediation of soil or groundwater contaminated with Hg(II) and the results suggest that the modification significantly improves the sorption properties of NZ.