

Arsenic characterization by indigenous bacterial activity in tailings using column experiments

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Mobility and speciation of As can be affected by pH, ORP (oxidation-reduction potential) and the bacterial activity in the environment. In this study, the effect of indigenous bacteria on As characterization was investigated using the laboratory column experiments. The tailings were collected from the Myoung-bong mine areas and As concentration of these tailings was 667 mg/kg. Influent solution, which was MSB media containing 1 mM D(+)-glucose, flowed upward through two columns filled with each bacterial and sterilized tailings for 6 days to stimulate the indigenous bacteria. Sterilized tailings were autoclaved at 121°C for 15 min to remove all indigenous bacteria. Activity of indigenous bacteria was found in bacterial tailings which was not treated.

These results indicated that the ORP of bacterial tailings significantly decreased and As and Fe concentrations increased up to 50 mg/l and 300 mg/l, respectively. However, the decreased level of ORP in sterilized tailings was significantly lower than that in bacterial tailings and As and Fe concentrations in sterilized tailings were below 3.7 mg/l and 2.2 mg/l, respectively. These results suggested that the addition of the influent solution may stimulate the activity of indigenous bacteria resulting in the decrease of ORP and the release of As and Fe. Therefore, the stimulated indigenous bacteria can be used to naturally remove As from the contaminated tailings.

Key word: Arsenic characterization, Indigenous bacteria, Column experiments

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