



Effect of temperature on efficiency of galena bioleaching using indigenous acidophilic bacteria

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Bioleaching has been widely applied on an industrial scale due to the advantages of low cost and environment friendliness, without strict requirements of raw material composition, and is suitable for the treatment of complex and low-grade ores. Temperature is an important factor for enhancement of bioleaching efficiency. This study investigated the influence of temperature on the bioleaching efficiency of galena which taken from an abandoned mine in Australia using indigenous acidophilic bacteria living in a hot acidic spring in Hatchobaru, Japan. We conducted the batch experiments at two different temperature conditions: 32 degrees Celsius and 42 degrees Celsius. The results showed that the value of pH in bacteria incubation sample exhibited lower than in the absent bacteria sample. And the contents of both Pb and Zn at 32 degrees Celsius appeared lower than at 42 degrees Celsius. In the SEM analysis, we observed the bacteria with the various shapes and size on the galena surface after 6 days from inoculation: rod-shaped bacteria range from 0.4×1.3 micrometer to 0.5×1.6 micrometer at 32 degrees Celsius and the extracellular polymeric substance (EPS) forms at 42 degrees Celsius. Additionally, through SEM analysis we found a number of hexagonal column crystals which coated the galena surface and attachment of bacteria to the surface of hexagonal crystals at 32 degrees Celsius 3 days after inoculation. And the distinct corrosion pits formed by the direct contact attachment of indigenous bacteria were observed on the surface of secondary minerals. This study demonstrates that the efficiency of galena bioleaching enhances by increasing the temperature from 32 degrees Celsius to 42 degrees Celsius.