Microbial community study of the process- and groundwater of the Sishen Iron-Ore Mine, South Africa

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Abstract

Investigating the microbial community of the Sishen Iron-Ore Mine in South Africa has become a topic of interest. Micro-organisms could prove to be useful in bioleaching processes, resulting in the minimisation of the negative impact that certain substances, such as phosphorus (P) and potassium (K), have on the economic functioning of the mine. The objective of this investigation was, therefore, to determine which micro-organisms were indigenously present in the process- and groundwater systems of the mine. Groundwater samples and three different process water samples were collected from the mine, followed by chemical- and microbial community analyses. Microbial inhibition was observed in all the process water samples due to the relatively high levels of copper, chromium and zinc present. *Aeromonas hydrophila* proved to be the dominant bacterial species in all the process water samples, whereas *Pseudomonas aeruginosa* and *Herbaspirillum* spp. were observed in the groundwater of the mine. None of the isolated micro-organisms have been implicated in bioleaching practices, and therefore these organisms will not be included as candidates for the removal of P and K from the iron-ore of the Sishen Iron-Ore Mine.

Keywords: Sishen Iron-Ore Mine, microbial community, process water, groundwater, bioleaching