

An investigation into the availability and role of oxygen gas in gold tailings dams of the Witwatersrand basin with reference to their acid mine drainage potential

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Abstract

The oxygen content of tailings dams around the Witwatersrand Basin was quantitatively measured over a period of 2 months using a multi-level gas sampling device (MLGS) in an attempt to understand the diffusion of oxygen in tailings dams as a result of acid mine drainage. The measured oxygen showed that the diffusion of oxygen in some Witwatersrand tailings dams is up to a depth of 4 m. In some instances the oxygen content in the layer 1m below the tailings surface decreased by a factor of more than 97% compared to the atmospheric content. The findings show that the development of oxidation zones in the tailings dams of Witwatersrand Basin which subsequently leads to acid mine drainage is limited by the amount of available oxygen in the tailings materials.

Keywords: oxygen, oxidation zone, acid mine drainage