

ANALISIS POTENSI TAILING EMAS SEBAGAI MEDIA TANAM MELALUI PEMISAHAN TIMBAL (Pb) MENGGUNAKAN TEKNOLOGI *NANOBUBBLE*

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ABSTRAK

Tailing, limbah sisa dari proses penambangan emas, umumnya mengandung logam berat berbahaya seperti timbal (Pb) yang berpotensi mencemari lingkungan, khususnya tanah. Penelitian ini bertujuan untuk menganalisis potensi tailing sebagai media tanam melalui upaya pemisahan logam toksik Pb dari material tailing. Sampel tailing diambil secara komposit dari penambangan dengan dua metode pengolahan berbeda, yaitu sianidasi dan amalgamasi. Ekstraksi Pb dari tailing dilakukan dengan metode flotasi berbasis teknologi *nanobubble*. Teknologi *nanobubble* menawarkan pendekatan inovatif yang efektif dalam memproses pemisahan logam berat dengan memanfaatkan gelembung berukuran nanometer untuk mengoptimalkan reaksi fisik dan kimia dalam larutan. Perbandingan kadar Pb-total sebelum dan setelah pemisahan dilakukan dengan AAS, didukung dengan analisis sifat kimia tailing. Analisis data dilakukan dengan metode perbandingan langsung antara kadar Pb dalam tailing setelah pemisahan dengan ambang batas toleransi Pb pada tanah berdasarkan standar US-EPA. Penurunan kadar Pb paling efektif diperoleh pada kombinasi reagen *collector* EDTA, *frother* MIBC, dan *depressant* Na₂CO₃, yaitu sebesar 48,93% pada tailing sianidasi dan 56,73% pada tailing amalgamasi. Hasil penelitian menunjukkan efektivitas teknologi *nanobubble* dalam menurunkan kadar Pb dalam tailing, sehingga memungkinkan pemanfaatan tailing sebagai media tanam yang aman bagi tumbuhan.

Kata kunci : flotasi, media tanam, *nanobubble*, tailing, Timbal

**ANALYSIS OF GOLD TAILING POTENTIAL AS A PLANTING MEDIUM
THROUGH LEAD (Pb) SEPARATION USING NANOBUBBLE
TECHNOLOGY**

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ABSTRACT

Tailing, the residual waste from gold mining processes, generally contains hazardous heavy metals such as lead (Pb), which pose a risk of contaminating the environment, particularly soil. This study aims to analyze the potential use of tailings as a planting medium by removing toxic Pb from the material. Composite tailing samples were collected from mining operations using two different processing methods, cyanidation and amalgamation. Pb extraction was conducted using flotation method based on nanobubble technology. Nanobubble technology offers an innovative and effective approach for heavy metal separation by utilizing nanometer-sized bubbles to optimize physical and chemical reactions within the solution. The total Pb content before and after separation was analyzed using Atomic Absorption Spectrophotometry, supported by chemical property analysis of the tailings. Data analysis was carried out by direct comparison method between Pb levels after separation with the Pb tolerance threshold in soil based on US-EPA standards. The most effective Pb reduction was achieved using a reagent combination of EDTA (collector), MIBC (frother), and Na₂CO₃ (depressant), with reductions of 48.93% in cyanidation tailing and 56.73% in amalgamation tailing. The results demonstrate the effectiveness of nanobubble technology in reducing Pb content in tailings, thus enabling their potentially safe use as a planting medium.

Keywords : flotation, Lead, nanobubble, planting medium, tailing