

**BAKTERI RESISTEN LOGAM BESI (Fe) DARI KOLAM  
PENGOLAHAN LIMBAH AIR ASAM TAMBANG BATUBARA**

**SKRIPSI SARJANA BIOLOGI**



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## ABSTRAK

Penelitian tentang bakteri resisten logam besi (Fe) dari kolam pengolahan limbah air asam tambang batubara telah dilaksanakan pada bulan Januari 2025 sampai Mei 2025 di Laboratorium Riset Mikrobiologi, Jurusan Biologi, Fakultas Matematika dan Ilmu Pengetahuan Alam, Universitas Andalas, Padang. Tujuan penelitian ini adalah mengisolasi bakteri toleran Fe, menguji isolat terhadap konsentrasi bertingkat, menganalisis kemampuan isolat resisten menurunkan kadar Fe, dan karakterisasi isolat resisten. Metode penelitian ini menggunakan metode *survey* dengan teknik pengambilan sampel berupa *purposive random sampling*. Hasil penelitian ditemukan tiga isolat bakteri toleran pada limbah air asam tambang, ketiga isolat terbukti resisten terhadap konsentrasi bertingkat dan berpotensi menurunkan kadar logam Fe. Isolat terbaik adalah IAAT-1 dengan nilai OD<sub>600</sub> 1,781 dan penurunan konsentrasi Fe dari 250 ppm menjadi 76,60 ppm, dengan selisih penurunan sebesar 173,40 ppm. Karakterisasi ketiga isolat berbentuk basil; dua diantaranya Gram negatif, sedangkan satu Gram positif, dengan kemampuan membentuk spora.

**Kata kunci:** bakteri resisten, besi (Fe), bioremediasi, limbah air asam tambang, toleransi logam



## ABSTRACT

Research on iron (Fe)-resistant bacteria from the treatment pond of coal mine acid mine drainage was conducted from January to May 2025 at the Microbiology Research Laboratory, Department of Biology, Faculty of Mathematics and Natural Sciences, Universitas Andalas, Padang. The objectives of this study were to isolate Fe-tolerant bacteria, evaluate their tolerance at graded concentrations, analyze the ability of resistant isolates to reduce Fe levels, and characterize the resistant isolates. The study employed a survey method with purposive random sampling for sample collection. The results revealed three Fe-tolerant bacterial isolates from acid mine drainage, all of which were resistant to graded Fe concentrations and demonstrated potential in reducing Fe levels. The most promising isolate was IAAT-1, with an OD<sub>600</sub> value of 1.781, capable of reducing Fe concentration from 250 ppm to 76.60 ppm, corresponding to a reduction of 173.40 ppm. Characterization showed that all three isolates were rod-shaped; two were Gram-negative and one was Gram-positive, with the ability to form spores.

**Keywords:** bacterial resistance, bioremediation, iron (Fe), metal tolerance, acid mine drainage wastewater

