ABSTRAK

Luas lahan yang rusak akibat Pertambangan Emas Tanpa Izin (PETI) Mandor adalah ±1.000 Ha. Lahan tersebut mengandung endapan tailing berkadar sulfur tinggi sebagai potensial terbentuknya air asam tambang (AAT). Adapun tujuan penelitian ini untuk menganalisis potensi AAT dan energi listrik, analisis hasil karakterisasi sampel, pengujian *fuel cell* serta analisis perubahan pH dan konsentrasi Fe sebelum dan setelah pengujian *fuel cell.*

Metode penelitian ini dilakukan dengan *Composite Sampling* disertai pengujian in-situ dan pengukuran kolam. Kemudian karakterisasi sampel AAT melalui uji AAS dan pH, sedangkan sampel batuan melalui uji XRD dan XRF. Selanjutnya sampel AAT diolah menggunakan rangkaian *fuel cell* dan lampu, serta diuji laboratorium kembali melalui pengujian AAS dan pH. Tahap akhir ialah menghitung perubahan pH dan konsentrasi Fe.

Hasil pengukuran lapangan menunjukkan volume AAT sebanyak 22.396 liter. Menurut hasil uji XRD diketahui sampel batuan mengandung pirit, sedangkan hasil XRF terdeteksi beberapa unsur terbesar, seperti Fe, S, dan Mo. Sampel AAT sebelum pengolahan memiliki pH 2,1 dan konsentrasi Fe sebesar 6,67 mg/liter. Berdasarkan pengujian *fuel cell*, semakin lama sel bekerja semakin kecil tegangan dan kuat arus. Semakin banyak jumlah sel dan lampu maka semakin besar tegangan dan kuat arus, sehingga urutan waktu maksimum nyala lampu pada tiga *fuel cell* > dua *fuel cell* > satu *fuel cell*, serta potensi energi listrik dalam satu liter sebesar 0,25 Watt. Penelitian ini menaikkan pH dengan efektivitas 48,78%, 52,27% dan 56,25%, serta menurunkan konsentrasi Fe dengan efektivitas 97,90%, 98,50% dan 99,40%, sehingga uji Fe sesuai baku mutu Peraturan Menteri Lingkungan Hidup Nomor 5 Tahun 2014.

Kata kunci : air asam tambang (AAT), elektrokoagulasi, *fuel cell*, PETI, sulfida

ABSTRACT

The area of land damaged by the Unlicensed Gold Mining at the Mandor is ±1,000 Ha. The land contains tailings deposits with high sulfur content as a potential for acid mine drainage (AMD). The purpose of this study was to analyze the potential of AMD and electrical energy, analyze the results of sample characterization, test fuel cells and analyze changes in pH and Fe concentration before and after fuel cell testing.

This research method was carried out by Composite Sampling accompanied by in-situ testing and pond measurements. Then the characterization of AMD samples through AAS and pH tests, while rock samples through XRD and XRF tests. Furthermore, the AMD samples were processed using a series of fuel cells and lamps, and were tested in the laboratory again through AAS and pH testing. The final step is to calculate changes in pH and Fe concentration.

The results of field measurements show the volume of AMD as much as 22,400 liters. According to XRD test results, it is known that rock samples contain pyrite, while XRF results detected some of the largest elements, such as Fe, S, and Mo. The AMD sample before processing had a pH of 2.1 and a Fe concentration of 6.67 mg/liter. Based on fuel cell testing, the longer the cell works, the smaller the voltage and the stronger the current. The greater the number of cells and lamps, the greater the voltage and current, so that the maximum time sequence for the lights on three fuel cells > two fuel cells > one fuel cell, and the potential for electrical energy in one liter of 0.25 Watt. This study raises the pH with an effectiveness of 48.78%, 52.27% and 56.25%, and decreases the concentration of Fe with an effectiveness of 97.90%, 98.50% and 99.40%, so that the Fe test is in accordance with the quality standard in Minister of Environment Regulation Number 5 of 2014.

Keywords: acid mine drainage (AMD), electrocoagulation, fuel cell, illegal mining, sulfide