

# Utilization of fly ash and organic material as dry cover system to prevent acid mine drainage generation

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## 1. INTRODUCTION

The common practice in AMD prevention is a dry cover technique. In this technique, rock that is potential in producing acidity (PAF) will be placed below non-acid producing rock (NAF). Depends on NAF availability in the mine site situation, organic covers can be used to prevent diffusion of oxygen into reactive sulphide wastes and subsequently to eliminate sulphide compounds oxidation and generation of acidic waters. The utilization of additional material cover layer is proposed, by using fly ash and organic material combination. To investigate the possibility of using these materials, a column leaching test in the laboratory scale was conducted with several scenarios of simulation. By comparing between a column with different thickness of fly ash and organic material, the leachate water behavior is observed in the experiment, including the measurement of water quality (pH and EC), major cations-anions. The result suggests the possible thickness of fly ash (FA) and organic material (OM) as cover layer material, especially in the case of mine with domination of PAF rock material.

## 2. MATERIALS AND METHODS

Rock samples were collected from two different dumping area in mining PT Bukit ASAM, Coal mine in Indonesia. 8 samples were collected, afterward and analyzed by static test to know the capacity in producing acid. FA was collected at Bankgo Asam coal-steam power plant, OM was obtained from the palm oil processing company. This OM is a waste from the empty fruit bunches of oil palm that can be found easily in surrounding mine site. The static test consists of Paste pH and EC, Net Acid Generating (NAG) and ABA (Acid Base Accounting). Initial characterization using XRF (X-ray fluorescence) was done. Acid-base Accounting (ABA) calculation method was conducted based on the Acid Neutralization Capacity (ANC) test and Total Sulfur test (Maximum Potential Acidity – MPA) results. ABA is calculation method to measure the long-term potential for dump rocks to generate acid. Once get results from static test, column leaching test were conducted using different thickness of fly ash and organic material in order to know effectiveness of cover material in the laboratory scale. During the column leaching test, P6 as PAF rock, fly ash (FA) and organic material (OM) and N1 as NAF rock was used. Cover layer thickness were changed following 1.5cm with ratio of FA1:OM0.5 and FA0.5:OM1, 3cm and 4.5cm with ratio of FA1:OM2 and FA2:OM1.

## 3. RESULT AND DISCUSSION

From static test results we can see that 6 samples are potential acid forming rocks. Based on result P6 and N1 rock samples was used to further experiment.

## 4. CONCLUSION

Based on the result of simulation on dry cover method combined with fly ash and organic material, leachate water shows an improvement in pH value and the reduction of metal concentration without negative impacts in each column. Moreover, design of Column FA:OM (2cm:1cm) shows more efficient results. Based on organic material characterization, its better to use thickness with minimum 2 times of fly ash mix with NAF.

Test		P6	N1	FA
ANC	kg H <sub>2</sub> SO <sub>4</sub> /ton	18.40	20.31	83.10
MPA		43.56	4.33	55.71
NAPP		25.16	-15.97	-27.39
ABA		43.06	-16.02	-28.03
NAG pH	pH	2.33	4.97	6.50
pH paste		2.36	6.53	10.12

Figure 1. Static test results of material for column test

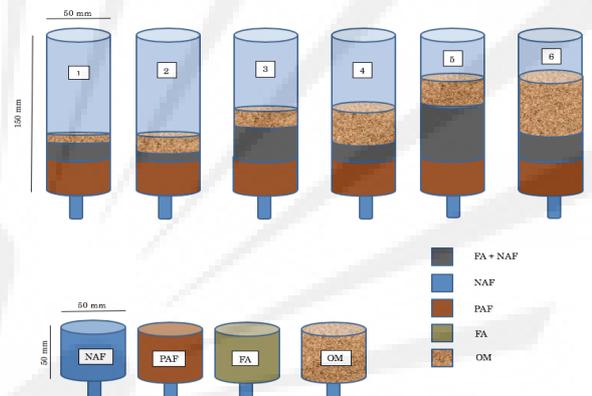


Figure 2. Scenario of column leaching test

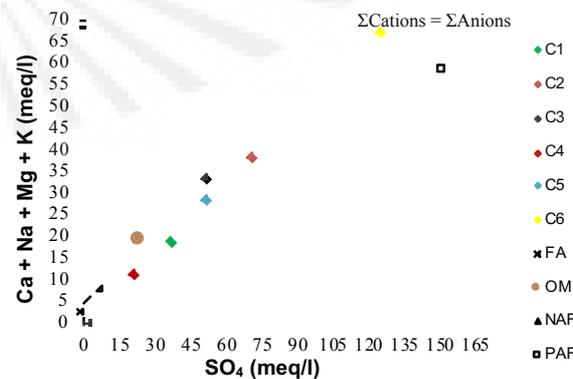


Figure 3. Major cations and anions in the leachate water of column