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Submission date: 04-Dec-2022 12:22PM (UTC+0700)

Submission ID: 1970571058

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Word count: 2532

Character count: 13431

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To cite this article: R Rahman *et al* 2020 *IOP Conf. Ser.: Earth Environ. Sci.* **575** 012224

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EXTENDED ABSTRACT DEADLINE: DECEMBER 18, 2020

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The effect of the addition of mangrove wood charcoal to reduce sulfur content in coal

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Abstract. Coal in Sulawesi, especially in South Sulawesi, has several shortcomings since it contains sulfur and produces a high ash content that affects the environment. Desulfurization with High-Temperature Combustion Methods is a sulfur content analysis method using the SC-144DR Dual Range Sulfur Analyzer coal tool, which is one of the methods used to reduce sulfur in coal. Based on the results of the study, it was obtained: a mixture of coal with mangrove wood charcoal with the composition of 25% Sin coal + 75% MWC = 0.067% sulfur content, 50% Sin coal + 50% MWC = 0.089% sulfur content and 75% Sin coal + 25% MWC = 0.107% sulfur content. These results indicate that the more addition of mangrove charcoal, the lower sulfur content in the coal. Decreasing sulfur content can improve the quality of the coal produced, especially in combustion systems that affect the environment.

1. Introduction

Coal is the most abundant resource in Indonesia, especially in South Sulawesi. In Indonesia, the coal is used around 70% for power plants by several power companies, around 10% for the cement industry, and the remaining 20% is utilized by other industries and in the metallurgical process. As economic growth increases, the amount of petroleum reserves is running low, so coal utilization increases [1,2].

There are some weaknesses in the use of coal as fuel, one of which is that the coal contains a high content of ash and sulfur. At the combustion process, the coal will produce emissions of toxic particulate matter, trace elements, and SO₂ which significantly impact the environment [3,4] According to [1] coal in Bulupodo and Bongki Villages, Sinjai Regency produces moderate-high ash content which shows that clay is the mineral that contributes the most through microscopy analysis.

In Indonesia, based on [5], the high total sulfur, ash content, and low calorific value significantly affect the quality of coal, especially those found in Sulawesi. Coal in South



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Section South Sulawesi Selatan Province. There are ten villages in East Sinjai district, namely Biroro Village, Kaloling Village, Kampala Village, Kessingmarannu Village, Lasiai Village, Panaikang Village, Patalassang Village, Sanjai Village, Saukang Village, Saukang Village, Mangara Bombang Village and Tongke-tongke Village [33] In this study the location of coal sampling is located in the village of Kaloling, East Sinjai, South Sulawesi and mangrove wood charcoal is located not far from the coal sampling area, namely in the Village of Magara Bombang, East Sinjai, South Sulawesi.

In this study, coal crushing and mangrove wood charcoal were crushed separately so that the small size was obtained, which made it easier during the grinding process. After the crushing process is carried out, the grinding process is carried out and then the sample is sieved using a 200 mesh sieve size for each sample [6,34] A 200 mesh sieve size was used to accelerate combustion so that perfect combustion was obtained during sulfur analysis. This research, High-Temperature Combustion A method is a method for analyzing sulfur content using the Dual Range Sulfur Analyzer SC-144DR (ASTM D. 3177).

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3. Results and discussion

3.1. Sulfur Analysis

3.1.1. Before mixture

The result of Sulfur analysis before in a mixture of coal and mangrove wood charcoal is shown in the

Table 1. Sulfur analysis before in a mixture of coal and mangrove wood charcoal

ID Sample	Sulfur (%)
Sin coal	0.272
MWC (mangrove wood)	0.029

SIN: Sinjai Coal

MWC: Mangrove Wood Charcoal

The sulfur analysis in table 1. shows that Sinjai coal contains quite a lot of sulfur, while mangrove wood charcoal contains a bit of sulfur content. Nevertheless, Sinjai coal is still considered safe or low sulfur category >1% [1,34]

3.1.2. After mixture

The result of sulfur analysis after getting mixed with the coal and mangrove wood charcoal is shown in Table 2.

Table 2. sulfur analysis after getting mixed with the coal and mangrove wood charcoal

Sin coal (%)	ID Sample		Sulfur (%)
	MWC (%)		
75	25		0.067
50	50		0.089
25	75		0.107

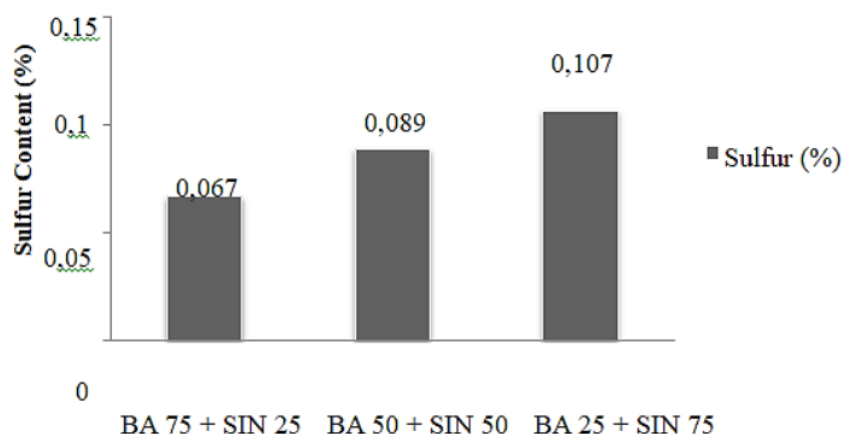


Figure 2. Graph of sulfur analysis after getting mixed with the coal and mangrove wood charcoal

Table 2 and figure. 2 show significant results, for the mixture of coal with mangrove charcoal with a composition of 25% Sin coal + 75% MWC = 0.067% sulfur, 50% Sin coal + 50% MWC = 0.089% and 75% Sin coal + 25% MWC = 0.107%. Based on the findings of this study, it can be concluded that the more addition of mangrove charcoal, the lower sulfur content in the coal. Decreasing sulfur content can improve the quality of the coal produced, especially in combustion systems that affect the environment [2,4].

4. Conclusions

This study obtained significant results as follows. The lowest sulfur content is obtained from the composition of 25% Sin coal + 75% MWC = 0.067%, the second one is the composition of 50% Sin coal + 50% MWC = 0.089% and the highest one is 75% Sin coal + 25% MWC = 0.107%. Therefore, it can be concluded that the more addition of mangrove charcoal composition, the lower the sulfur content in the coal. As a result, mangrove charcoal is best used as desulphurization in the coal. The sulfur content obtained can affect the quality of the coal, so it can be utilized as the best quality alternative energy source, especially for the environment.

Acknowledgment. Thank to Hasanuddin University, Mining Engineering Department staff (Dr. Sufriadin, ST. MT, Akmal Saputno, ST., and Ardi Alam Jabir, ST.) and my friend Sukmawati and Wahyu Saputra were helped us in editing pictures, the field, laboratory to prepare samples until analysis. Special thanks to Prof. Dr. rer. nat., Ir. A. M. Imran, for his helpful comments, to improve our paper.

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