



Coal Quality Analysis Based on Proximate and Ultimate Test Results in Massenreng Pulu Village, Lamuru District, Bone Regency

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ABSTRACTS

Coal is one of the minerals that have an important role in the mining industry in Indonesia. Massenreng Pulu Village, Lamuru District, Bone Regency, South Sulawesi Province, is an area that has coal resources, the quality of coal in that area needs to be known. The quality of coal has a vital important role in the utilization of coal. Coal quality parameters will affect the intended use of coal. The purpose of this study aim to analyze the quality of coal based on the proximate and ultimate analysis tests. The sampling method was channel sampling, samples from the field were then brought to the laboratory for preparation and analysis proximately and ultimately. The results of the proximate analysis of coal samples contained an average moisture content of 15.75% ar, ash content of 3.48% ar, volatile matter of 42.35% ar and fixed carbon of 37.91% ar while the results of the ultimate analysis of coal samples contained an average of 66.52% carbon. wt, 4.6% wt hydrogen, 0.93% wt nitrogen and 23.05 wt oxygen. Based on the ash content, if classified according to The UNECE 1998 classification of in seam coals, it can be seen that the rank of coal in the study area is classified as high grade coal.

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INTRODUCTION

Coal is one of the minerals that has an important role in the mining industry in Indonesia (Kadir, A.R et al., 2017; Widodo, S et al., 2017). One of the main parameters that determine a processing activity and utilization of coal minerals is the quality of coal (Budiman, A.A., & Anshariah, A., 2017; Shabiruddin, et al., 2022), the quality of coal needs to be known to determine whether the coal is profitable to mine (Avicenna, M.F et al., 2019; Aulia, A et al., 2021). Coal quality assessment is determined by several parameters contained in coal which are determined from a number of analyzes in the laboratory (Huseini, F et al., 2018; Nur, Z. & Oktavia, M., 2019; Oratmangun, T. A et al., 2021).

Massenreng Pulu Village, Lamuru District, Bone Regency is one of the areas in South Sulawesi Province which has coal resources that need to be known for its quality (Malaidji, E et al., 2018; Annisa, A et al., 2021), coal quality has a very important role in coal utilization so that coal quality affects the purpose of coal use (Fadhili, M.A & Ansosry., 2019; Hilmi, A & Irfan, UR. A. M., 2021).

This research was conducted to determine the characteristics of coal quality at the research site using the proximate analysis method and the ultimate analysis method (Nugraha, A.P.S & Sihombing, F.M.H., 2021). In order to study, find out and obtain information about coal quality and determine coal quality based on the results of plotting ash values using THE UNECE 1998 classification of in seam coals located in Massenreng Pulu Village, Lamuru District, Bone Regency, South Sulawesi Province

METHODS

The research method is carried out with a combination of qualitative and inductive research. Conclusions are obtained from the results of the literature review, field data and laboratory analysis



results. The sample came from the village of Massenreng Pulu, Lamuru District, Bone Regency, South Sulawesi Province. Sampling was done by channel sampling at two different locations. The two samples represent the top and bottom of the coal seam weighing 5 kg each.

Samples from the field were then taken to the Mineral Processing Laboratory of Hasanuddin University to be prepared and analyzed proximately, while the ultimate analysis was carried out at the PT Sucofindo Makassar laboratory

The results of both proximate and ultimate analysis are then carried out data processing, the data is collected in a table and then an approach is made by making a graph that shows the value of the results of the proximate and ultimate analysis so that a conclusion can be drawn.



Figure 1. Coal sampling



Figure 2. Coal sample preparation

RESULTS AND DISCUSSION

Proximate Analysis

Based on the results of the analysis that was carried out in the laboratory using ASTM standards (Fitria., 2013; Ardinata, S et al., 2022), the results of the proximate analysis of the data obtained are moisture content, ash content, volatile matter and fixed carbon. The coal samples taken at the research site were divided into 2 samples, namely, sample A and sample B. The results of the proximate analysis can be seen in Table 1.

Table 1. Results of proximate analysis ASTM D-3172-13.

Parameter	Sample Code		Unit	Base
	A	B		
Moisture Content	16.18	15.32	% ar	adb
Ash Content	4.49	2.48	% ar	adb
Volatile matter	41.86	42.84	% ar	adb
Fixed Carbon	37.47	38.36	% ar	adb

It can be seen in table 1 above that the average value of the four parameters between sample A and sample B does not have a significant difference. If average, then the moisture content is 15.75% ar, ash content is 3.48% ar, the volatile matter is 42.35% ar and fixed carbon is 37.91% ar. The next analysis can be seen in Figure 3 below.

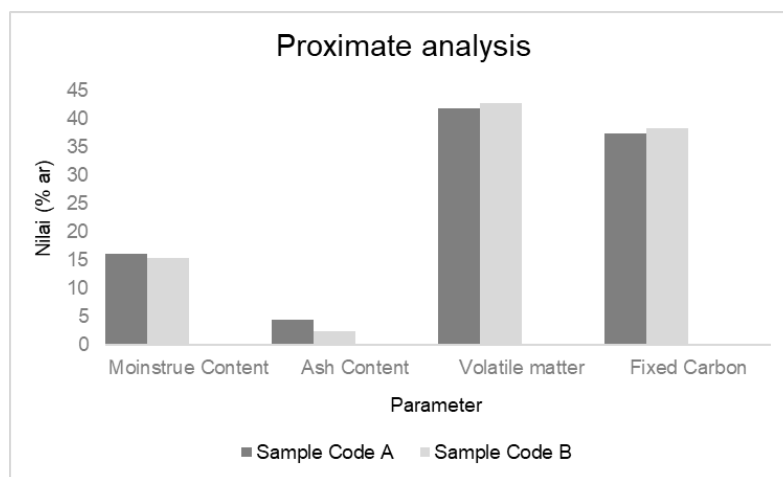


Figure 3. Result chart of proximate analysis ASTM D-3172-13

The diagram of the results of the proximate analysis above shows that the two samples only have quite different ash content values. The difference in the value of the ash content of the two samples is 2.01% ar while the other parameters are only less than 1% ar. This is thought to occur because sample A, which is the top of the coal, during transportation, sedimentation, and coalescence is mixed with organic and inorganic compounds resulting from the breakdown of the surrounding material.

Ultimate Analysis

Based on the results of the analysis that has been carried out in the laboratory, the results of the ultimate analysis of the data obtained are carbon, hydrogen, nitrogen, and oxygen. The coal samples taken at the research site were divided into 2 samples, namely, sample A and sample B. The results of the ultimate analysis can be seen in Table 2.

Table 2. Results of ultimate analysis

Parameter	Sample Code		Unit	Method
	A	B		
Carbon	66.26	66.79	% wt	Astm D-5373-2016
Hydrogen	4.62	4.59	% wt	Astm D-5373-2016
Nitrogen	0.93	0.93	% wt	Astm D-5373-2016
Oxygen	22.8	23.3	% wt	Astm D-3176-2009

It can be seen in table 2 above that the average value of the four parameters between sample A and sample B does not have a significant difference. If averaged, then the carbon content is 66.52% wt, hydrogen is 4.6% wt, nitrogen is 0.93% wt and oxygen is 23.05% wt. The next analysis can be seen in Figure 4 below.

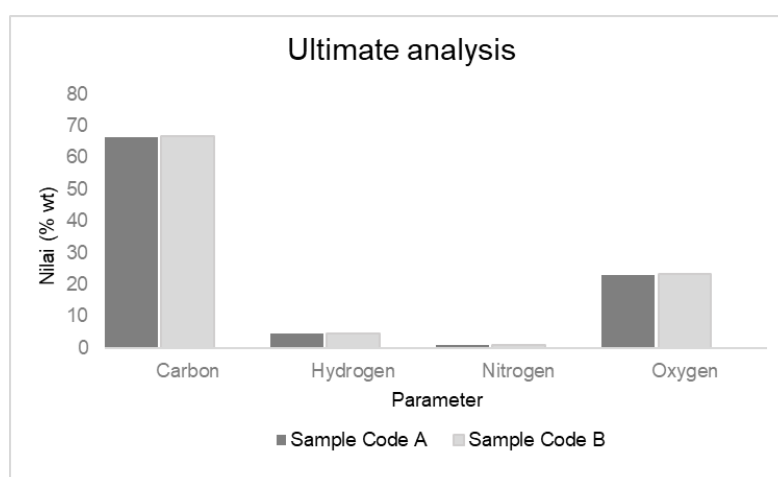


Figure 4. Result chart of ultimate analysis

The diagram of the ultimate analysis results above, shows that the two samples do not have significant carbon, hydrogen, nitrogen and oxygen content values. The average of the two samples only has a difference in content value below 0.5% wt. The ultimate parameter content value in coal indicates that coal in the study area has a fairly high calorific value, which is between 4,444 – 6,111 cal/gr.

Based on the results of the proximate analysis and ultimate analysis between the two samples, namely samples A and B, there was no significant difference except for the ash content, which had an average value of 3.48%. This can prove that the two coal samples still have the same layers, which are undergoing transportation, deposition and coalescence in the same time cage.

The results of plotting the ash value using The UNECE 1998 classification of in seam coals can be seen that the rank of coal in the study area is classified as high grade coal which is included in the bituminous coal type.

CONCLUSION

The results of the proximate and ultimate analysis of coal samples in Massenreng Pulu Village, Lamuru District, Bone Regency, it can be concluded that both samples contain an average moisture content of 15.75% ar, ash content of 3.48% ar, volatile matter of 42.35% ar and fixed carbon of 37.91%. ar while the results of the ultimate analysis of coal samples contained an average of 66.52% wt carbon, 4.6% wt hydrogen, 0.93% wt nitrogen and 23.05 wt oxygen. Based on the ash content, if classified according to The UNECE 1998 classification of in seam coals, it can be seen that the rank of coal in the study area is classified as high grade coal.

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