

SARI

Gas Metana Batubara (GMB) adalah gas yang dihasilkan dari lapisan batubara dan memiliki potensi sebagai sumber energi terbarukan yang menjanjikan dalam upaya diversifikasi energi menuju ekonomi rendah karbon. Kabupaten Berau merupakan salah satu penghasil batubara terbesar di Indonesia, dengan Formasi Latih sebagai salah satu formasi pembawa batubara utama di wilayah tersebut. Potensi sumber daya batubara yang melimpah memacu intensifikasi penelitian terkait GMB sebagai energi berkelanjutan dan ramah lingkungan. Penelitian ini bertujuan mengkaji pengaruh karakteristik batubara, khususnya aspek geokimia dan petrografi organik, terhadap kandungan GMB di Kabupaten Berau, Kalimantan Timur. Data diperoleh dari Pusat Sumber Daya Mineral Batubara dan Panas Bumi (PSDMBP) yang meliputi analisis inti bor, data sumur, dan properti gas dari tiga sumur yaitu PS, GR, dan LI. Analisis korelasi GMB dilakukan menggunakan metode regresi linear, *Pearson Correlation Coefficient* (PCC), dan *Principal Component Analysis* (PCA).

Karakteristik batubara daerah penelitian didominasi lignit A hingga sub-bituminus A dengan ketebalan lapisan batubara 0,1–8,05 meter, nilai reflektansi vitrinit 0,32–0,49%, kadar proksimat (adb) dengan moisture rata-rata 9,56%, *volatile matter* 44,81%, *ash* 15,6%, dan *fixed carbon* 37,4%. Analisis ultimat (daf) menunjukkan kandungan karbon rata-rata 74,47%, hidrogen 5,7%, nitrogen 1,25%, sulfur 2,7%, dan oksigen 18,1%. Komposisi maseral didominasi vitrinit (85,9–97,9%) dengan inertinit 0,1–3% dan liptinit 0,1–4,3%. Kandungan *gas content* berkisar 0,37–26,13 scf/ton dengan proporsi CH₄ 7,68–73,03%. *Gas content* dipengaruhi secara positif oleh *fixed carbon*, hidrogen, karbon, nitrogen, sulfur dan maseral inertinit, sedangkan *moisture*, oksigen, dan ash berpengaruh negatif terhadap desorpsi gas. Reservoir GMB di daerah penelitian tergolong berperforma rendah dengan tingkat kejenuhan gas kurang dari 30%.

Kata Kunci : Gas Metana Batubara, Berau, Formasi Latih, Geokimia batubara, petrografi organik

ABSTRACT

Coalbed methane (CBM) is a gas produced from coal seams and has the potential to be a promising renewable energy source in efforts to diversify energy towards a low-carbon economy. Berau Regency is one of the largest coal producers in Indonesia, with the Latih Formation as one of the main coal-bearing formations in the region. The abundant coal resource potential has spurred intensified research on CMG as a sustainable and environmentally friendly energy source. This study aims to examine the influence of coal characteristics, particularly geochemical and organic petrographic aspects, on CMG content in Berau Regency, East Kalimantan. Data were obtained from the Coal and Geothermal Mineral Resources Center (PSDMBP), which included core analysis, well data, and gas properties from three wells, namely PS, GR, and LI. GMB correlation analysis was performed using linear regression, Pearson Correlation Coefficient (PCC), and Principal Component Analysis (PCA) methods.

The characteristics of coal in the study area are dominated by lignite A to sub-bituminous A with a coal layer thickness of 0.1–8.05 meters, vitrinite reflectance value of 0.32–0.49%, proximate matter (adb) with an average moisture content of 9.56%, volatile matter of 44.81%, ash 15.6%, and fixed carbon 37.4%. Ultimate analysis (daf) shows an average carbon content of 74.47%, hydrogen 5.7%, nitrogen 1.25%, sulfur 2.7%, and oxygen 18.1%. The maceral composition was dominated by vitrinite (85.9–97.9%) with inertinite 0.1–3% and liptinite 0.1–4.3%. The gas content ranged from 0.37 to 26.13 scf/ton with a CH₄ proportion of 7.68–73.03%. Gas content is positively influenced by fixed carbon, hydrogen, carbon, nitrogen, sulfur, and inertinite maceral, while moisture, oxygen, and ash negatively affect gas desorption. The GMB reservoir in the study area is classified as low-performance with a gas saturation level of less than 30%.

Keywords : Coal Methane Gas, Berau Regency, Latih Formation, Coal Geochemistry, Organic Petrography